Journal, June 16, 1954

INSTITUTION NUMBER

Gas Journal

OL. 278. 106TH YEAR. LONDON, JUNE 16, 1954. NO. 4750. PRICE 2/6

It was in 1816 that we first started manufacturing gas meters — since when our object has been to achieve long meter life with consistent registration. It is the combination of these points with other well known features that enables us to claim that nowhere in the world is a gas meter made with a performance superior to our own.

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(A DIVISION OF PARKINSON & COWAN LIMITED)

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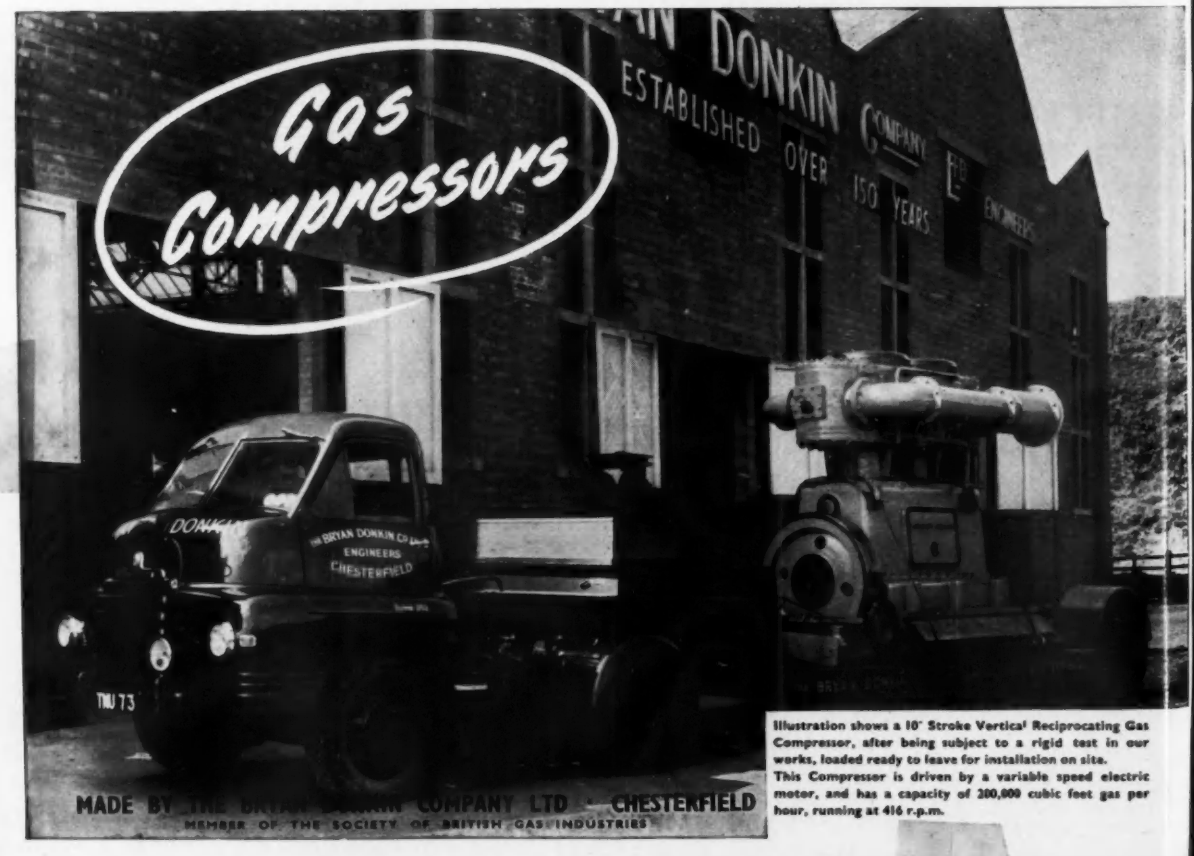
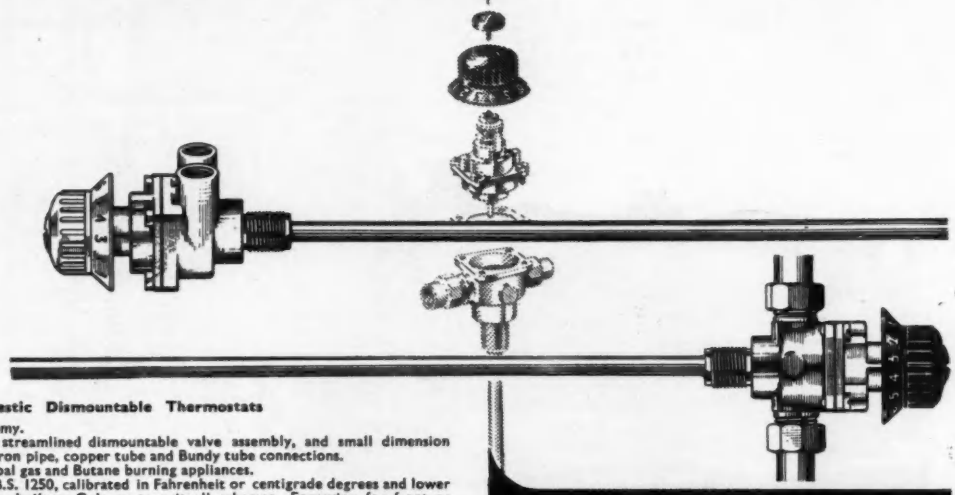


Illustration shows a 10" Stroke Vertical Reciprocating Gas Compressor, after being subject to a rigid test in our works, loaded ready to leave for installation on site.
This Compresser is driven by a variable speed electric motor, and has a capacity of 200,000 cubic feet gas per hour, running at 416 r.p.m.

DOMESTIC DISMOUNTABLE THERMOSTATS



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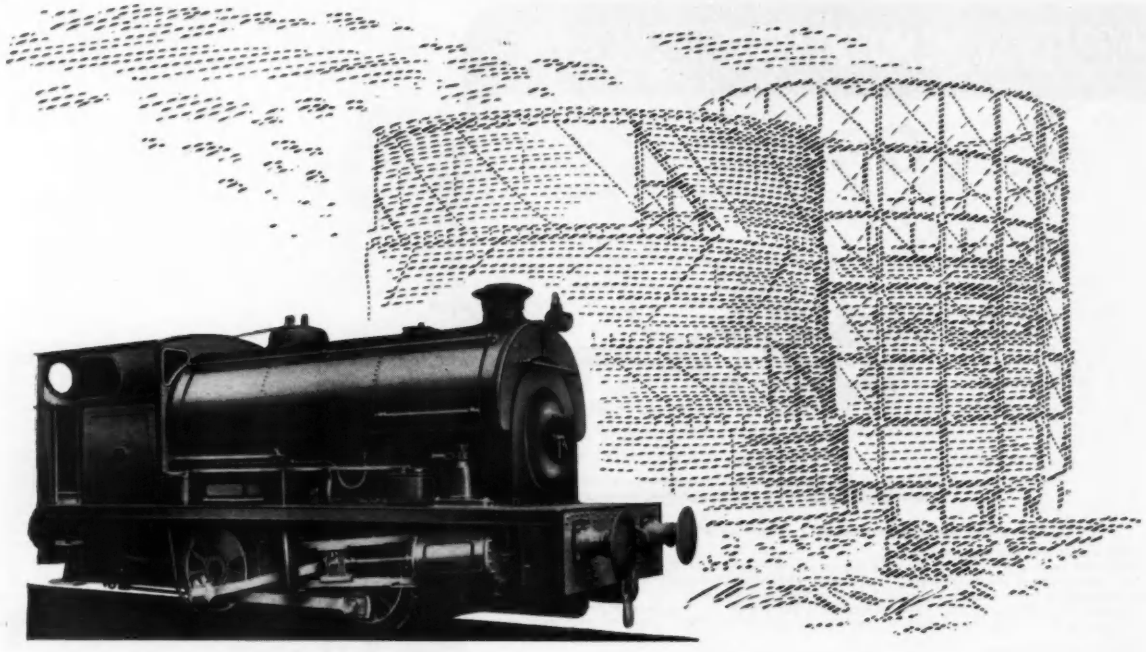

ELEVEN

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at Beckton Gas Works

The first Peckett locomotive delivered to the Beckton Works 33 years ago, is still pulling maximum loads. The locomotives now in service have 10", 12" or 14" cylinders and are of the 0-4-0 Class. All have been adapted from the Peckett range of standard designs. Steep gradients and severe bends are a feature of the Beckton Works track —conditions which Pecketts cope with comfortably, putting them among the most faithful servants at the works.

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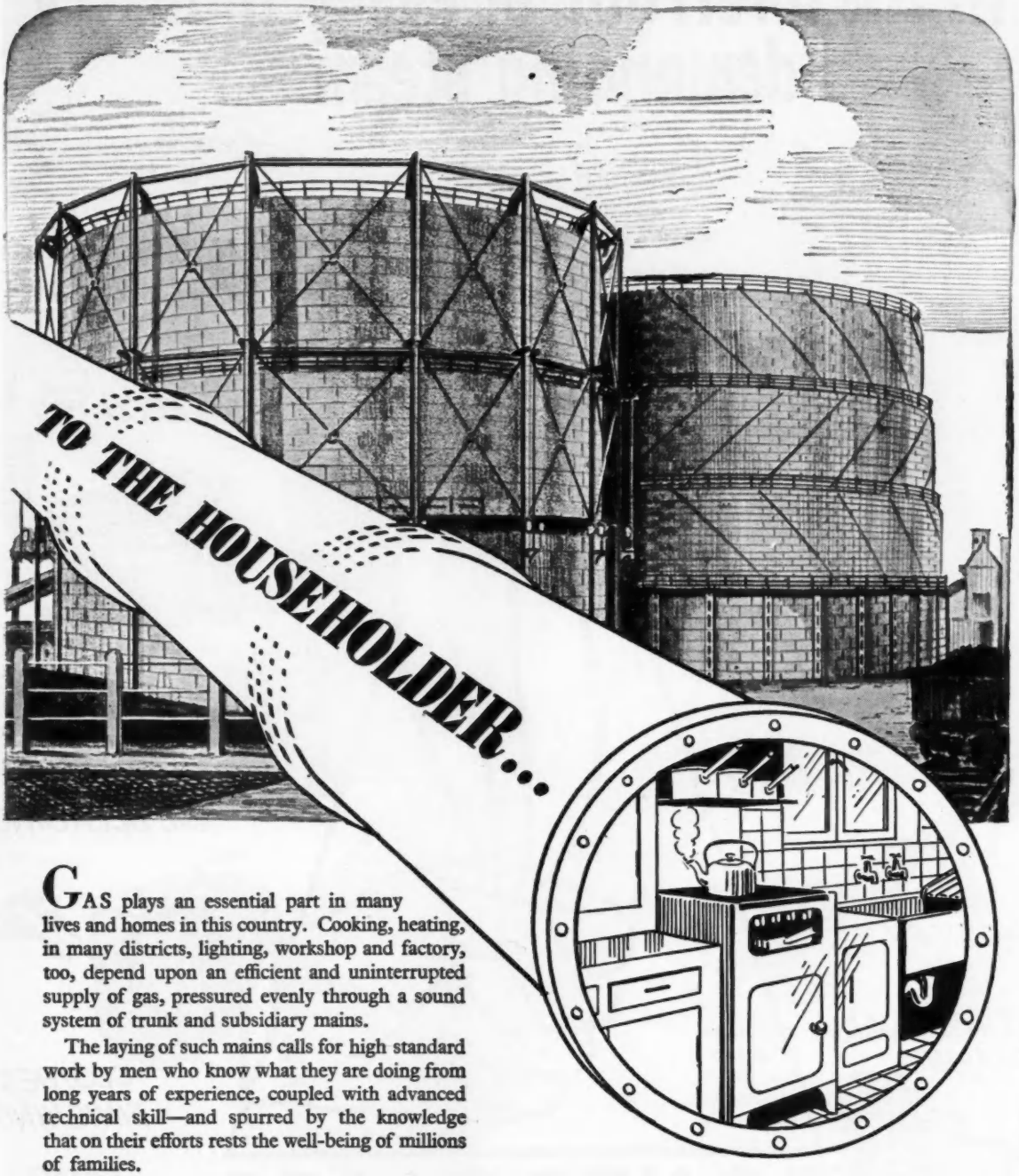

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The laying of such mains calls for high standard work by men who know what they are doing from long years of experience, coupled with advanced technical skill—and spurred by the knowledge that on their efforts rests the well-being of millions of families.

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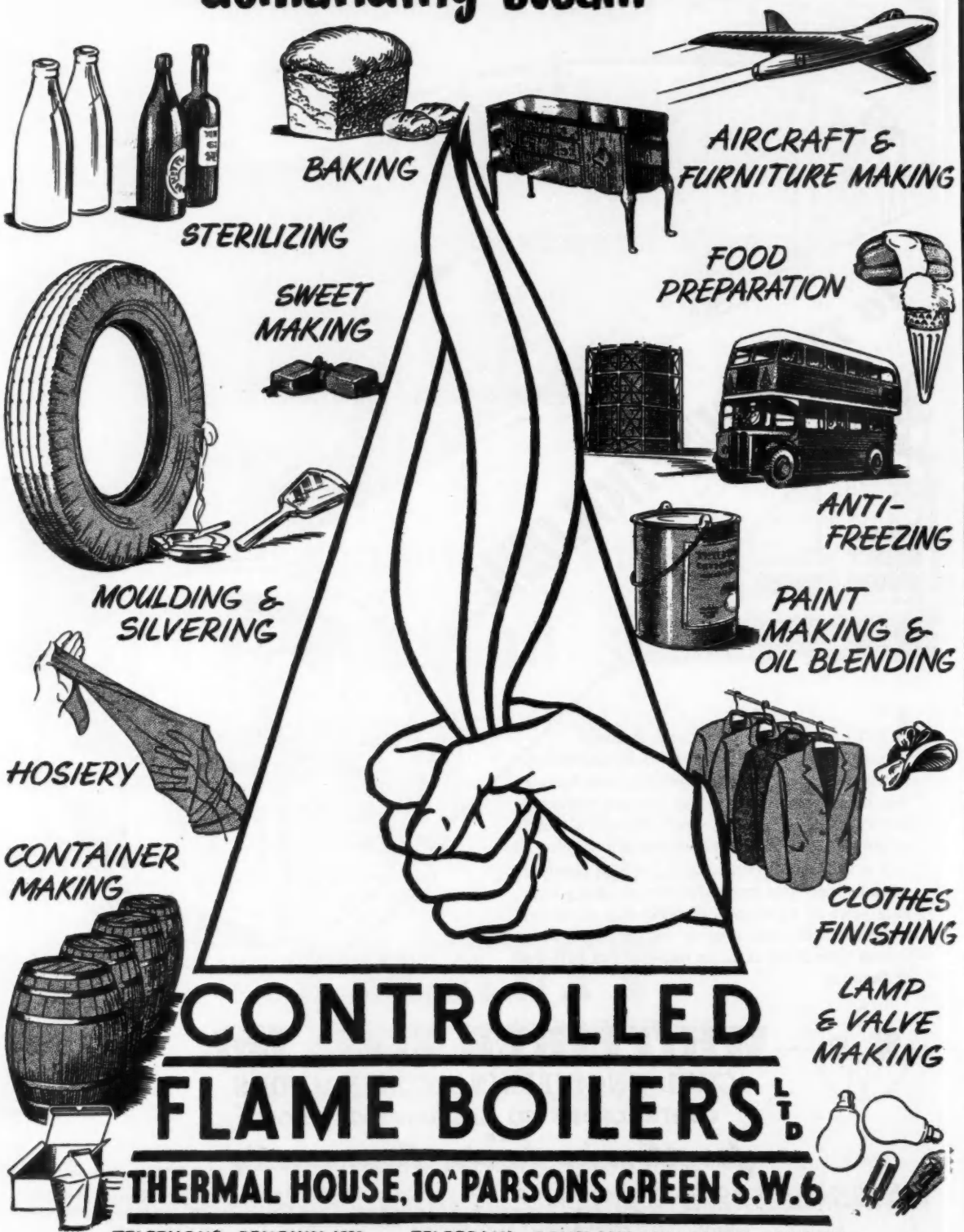

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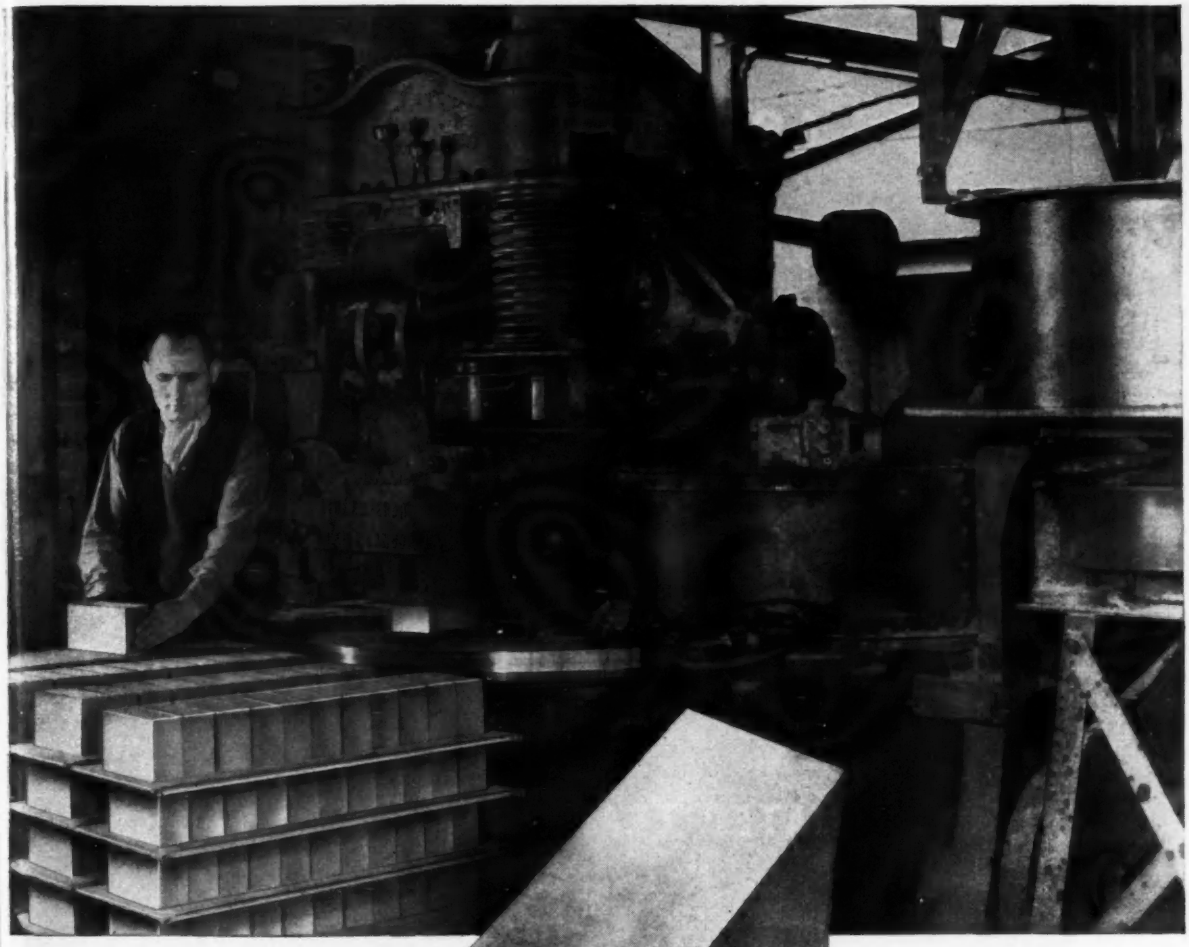

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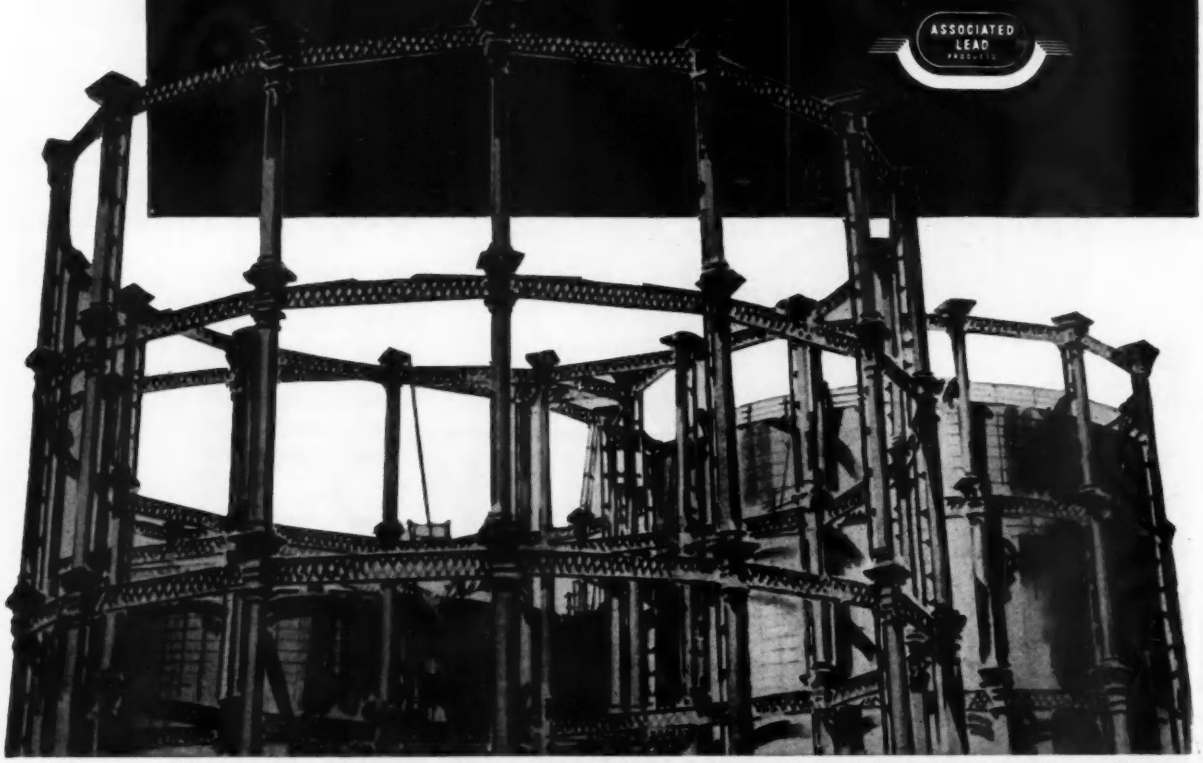

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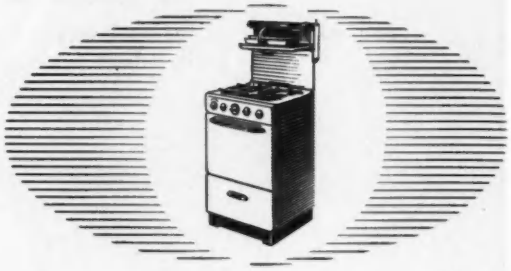

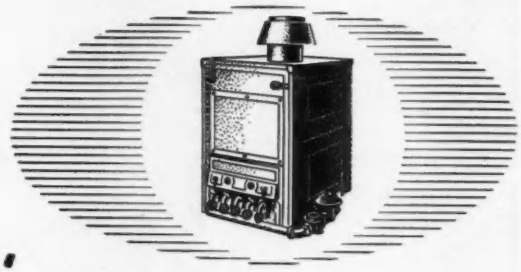

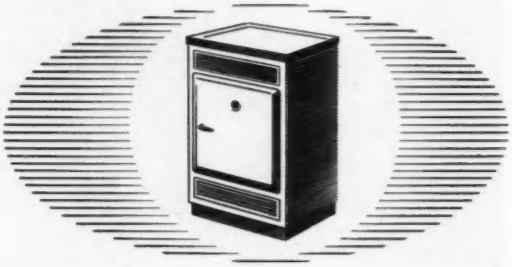

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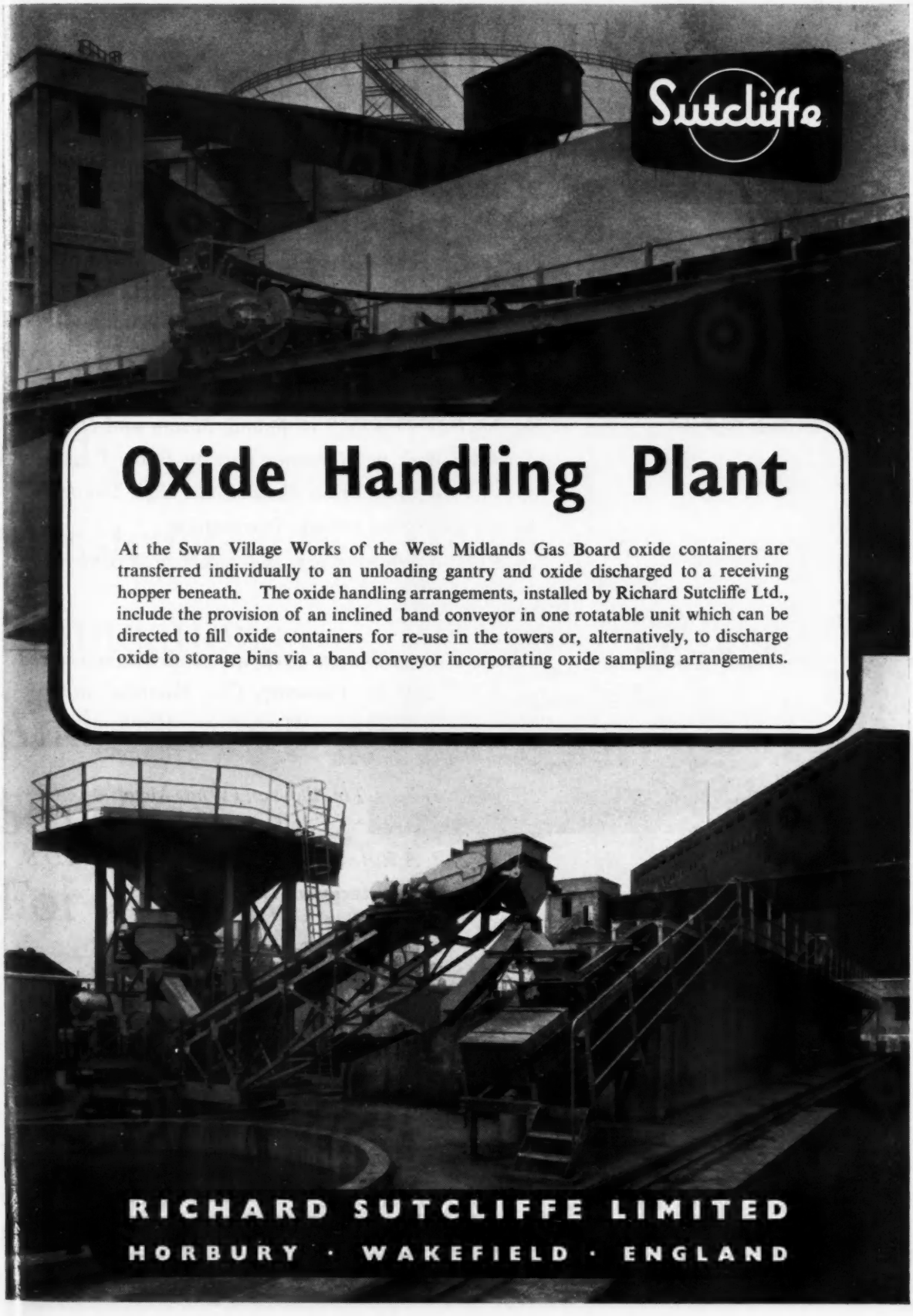
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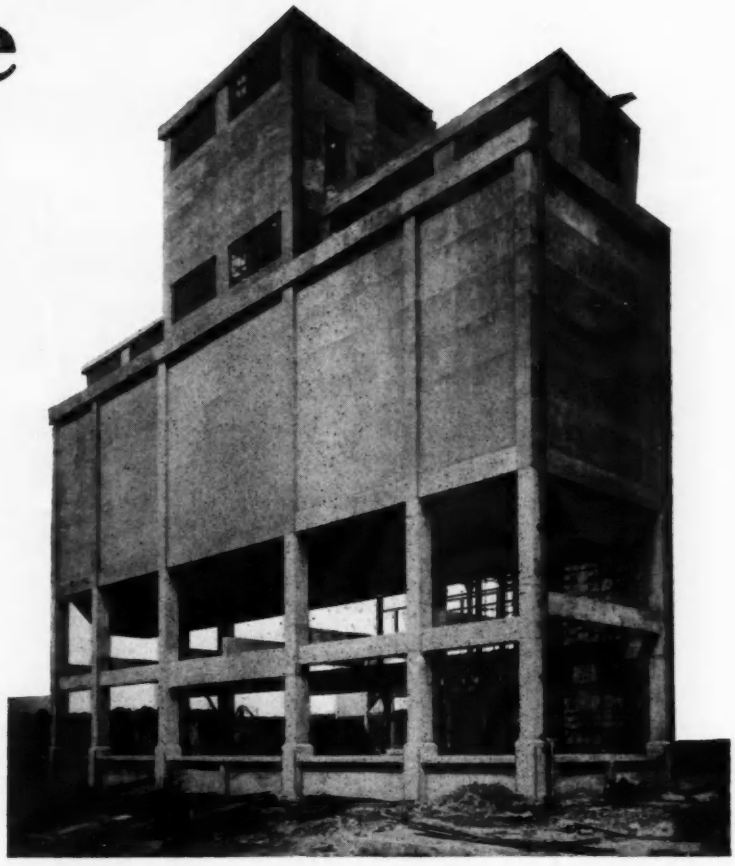

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The Coke Bunker illustrated was recently completed at Burnley.

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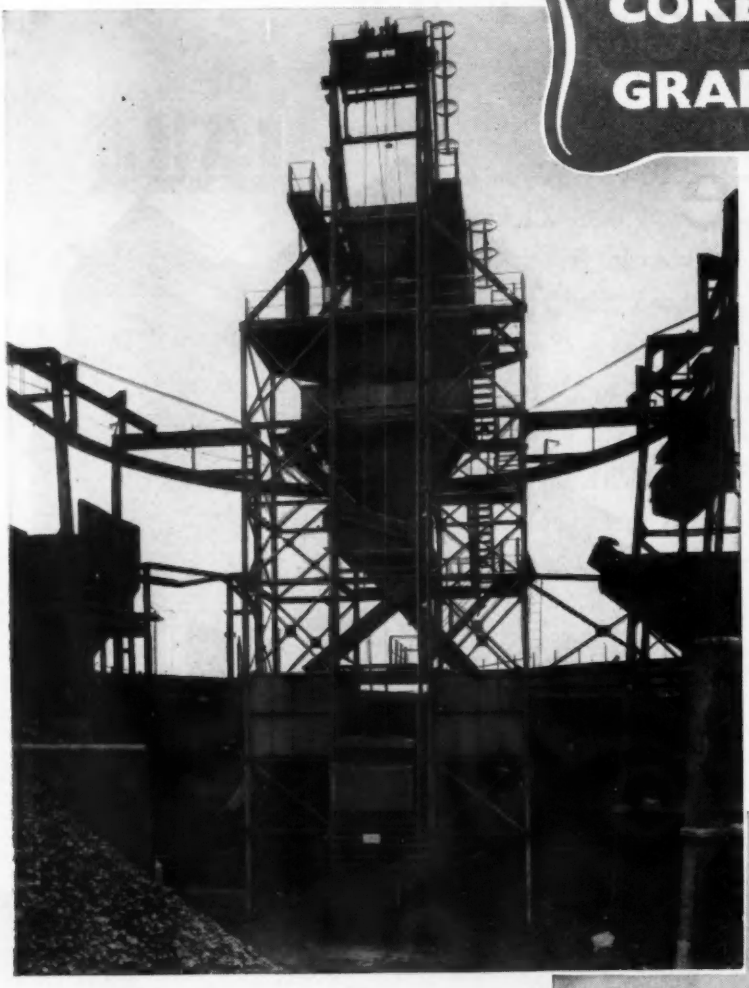
COKE HANDLING AND GRADING PLANT



COMPLETE coke handling and grading plant for the Northern Gas Board, comprising Skip Hoist, Storage Bunkers, Screens and complete supporting structure, dealing with 20 tons per hour. The Skip Hoist is of the unbalanced semi-automatic type with 18 cwt. capacity, lifting speed 80 ft. per min.

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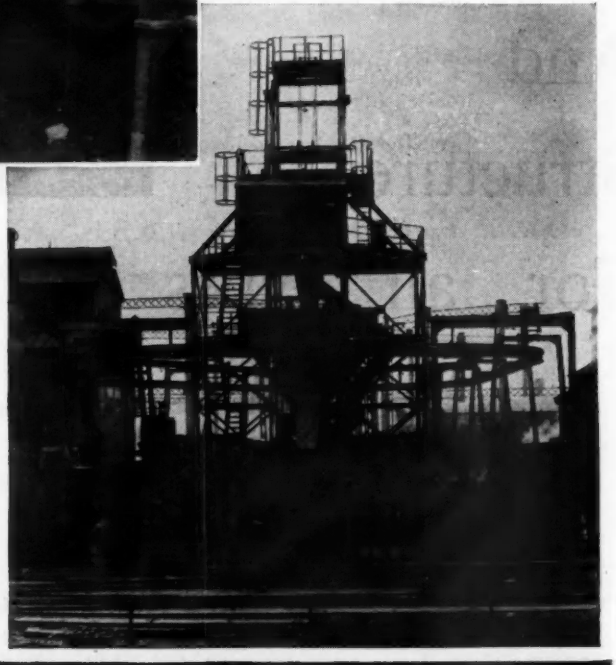

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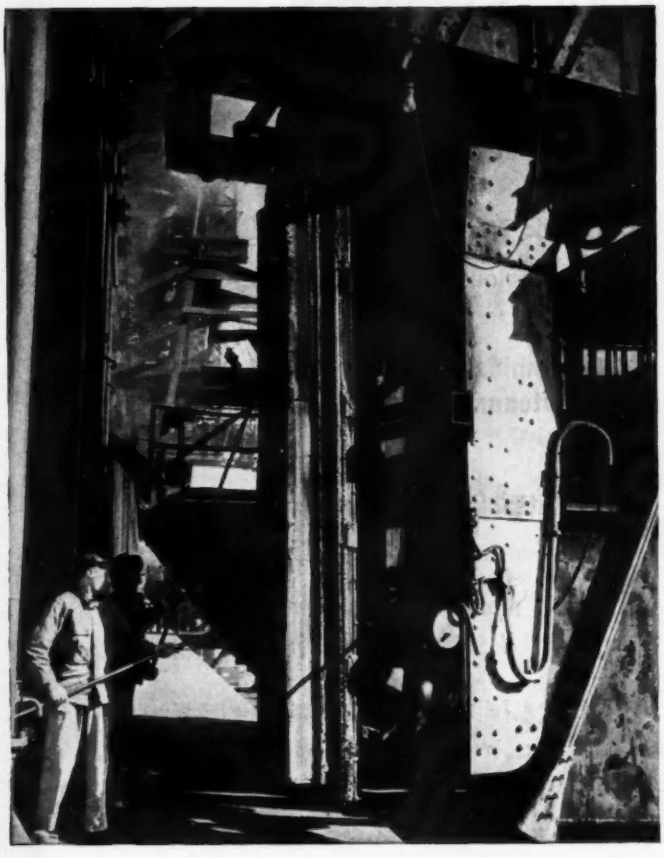

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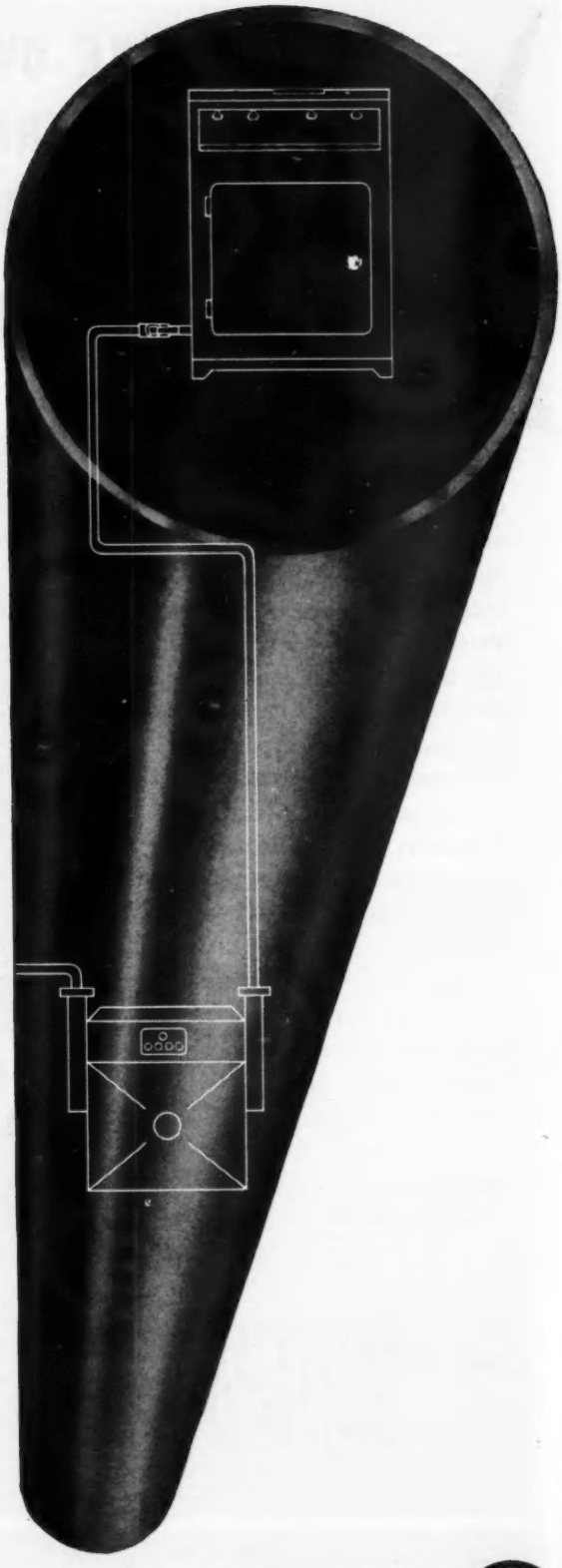

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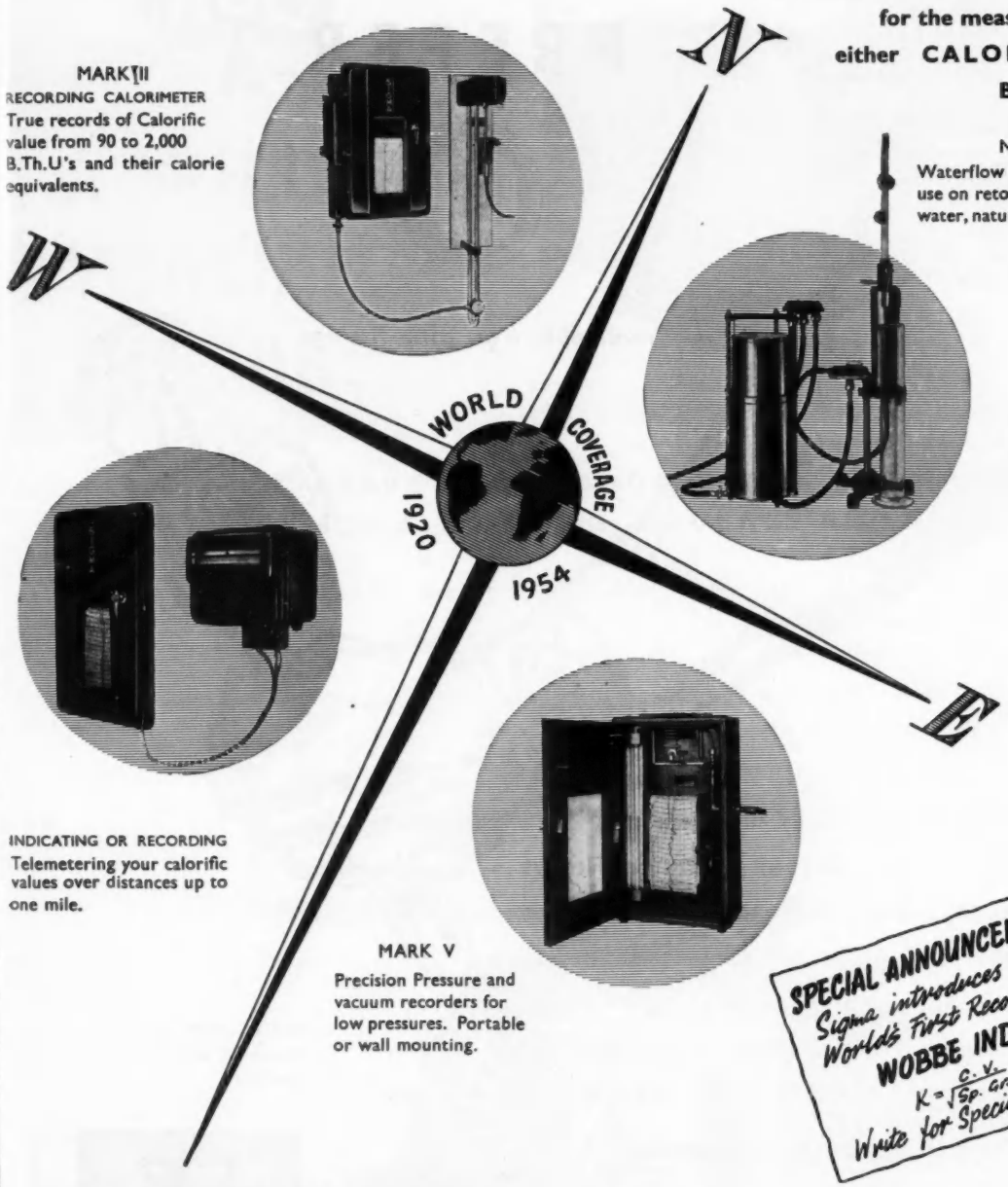

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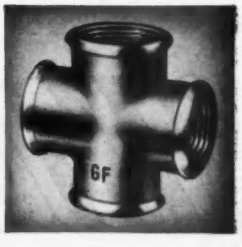

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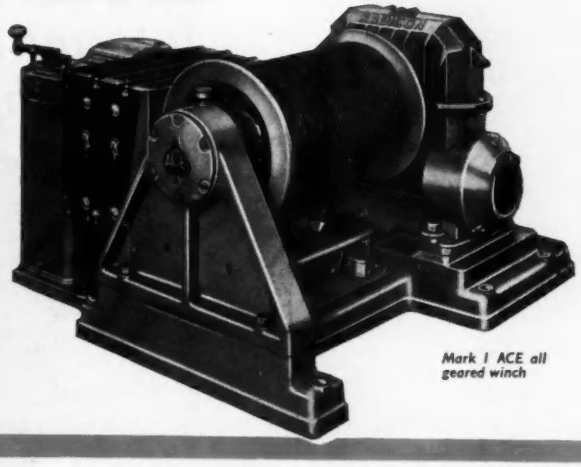

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- Speeds can be arranged up to 300 ft./min.
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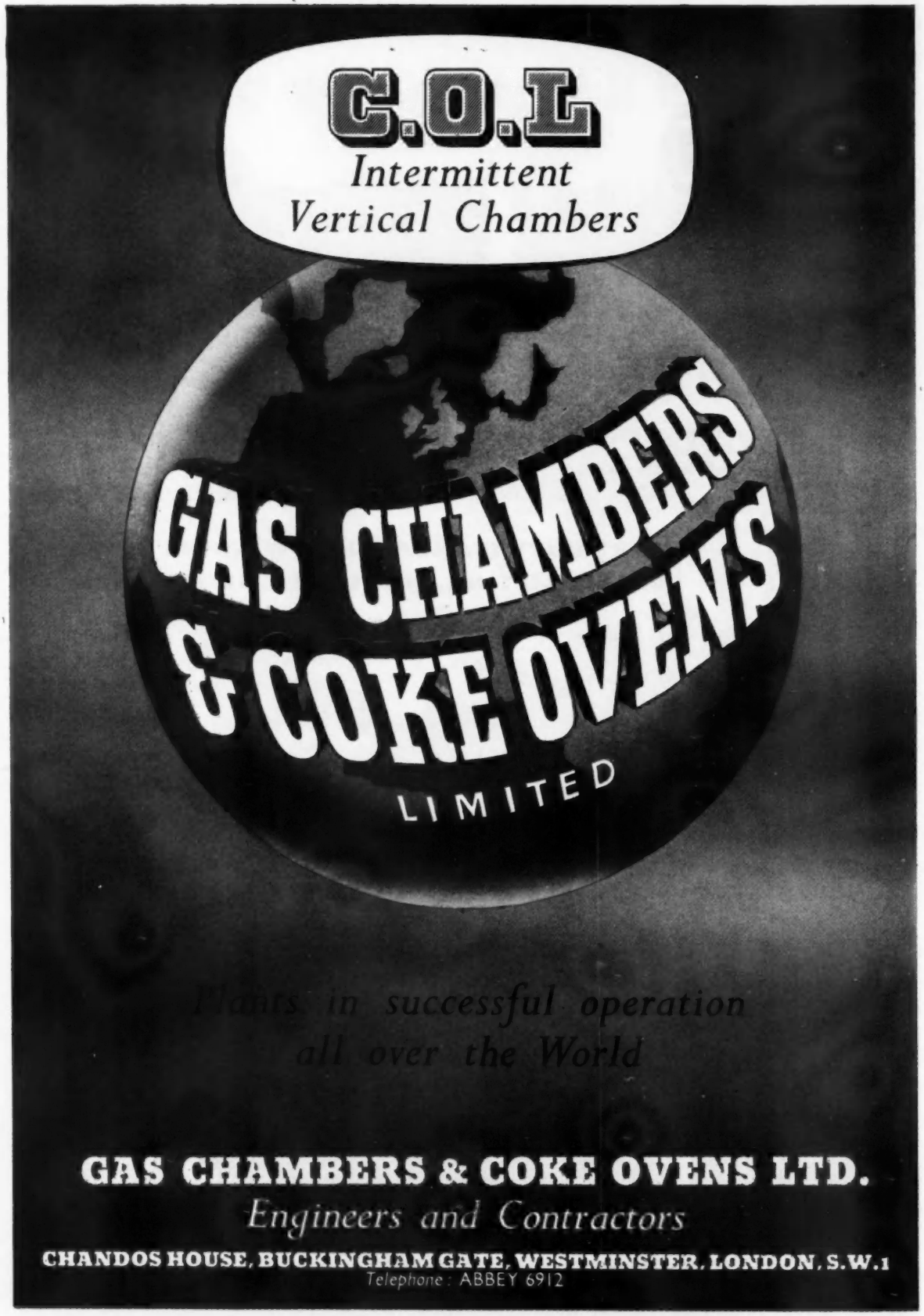
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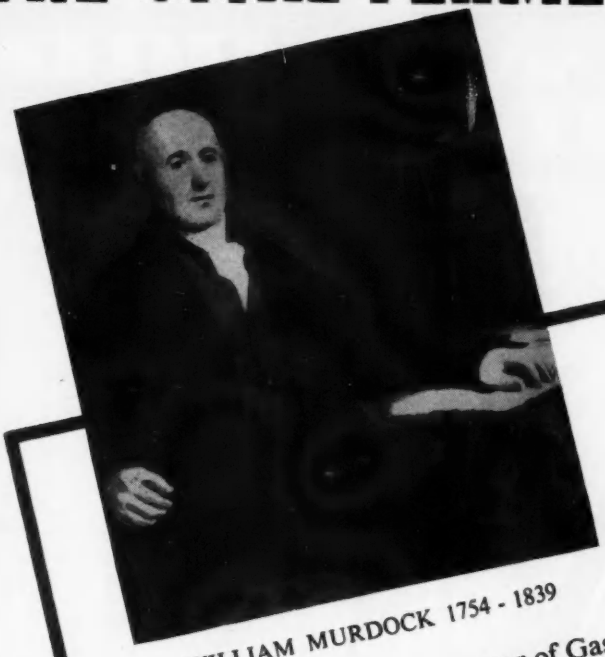
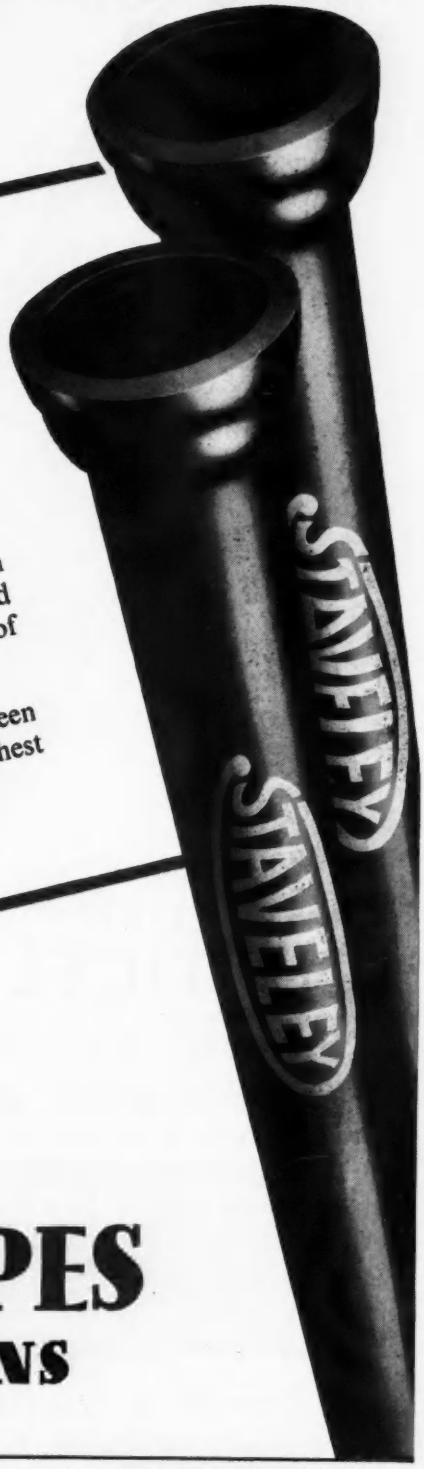


WILLIAM MURDOCK 1754 - 1839

Undoubtedly the "inventor of Gas lighting" and his work on the distillation of gas from coal and the practical use of that gas dominated the "gas industry" during the last 50 years of his lifetime.

For many years Staveley pipes have been recognised the world over as of the highest attainable standard for Gas mains.

Photograph by courtesy of the Gas Council



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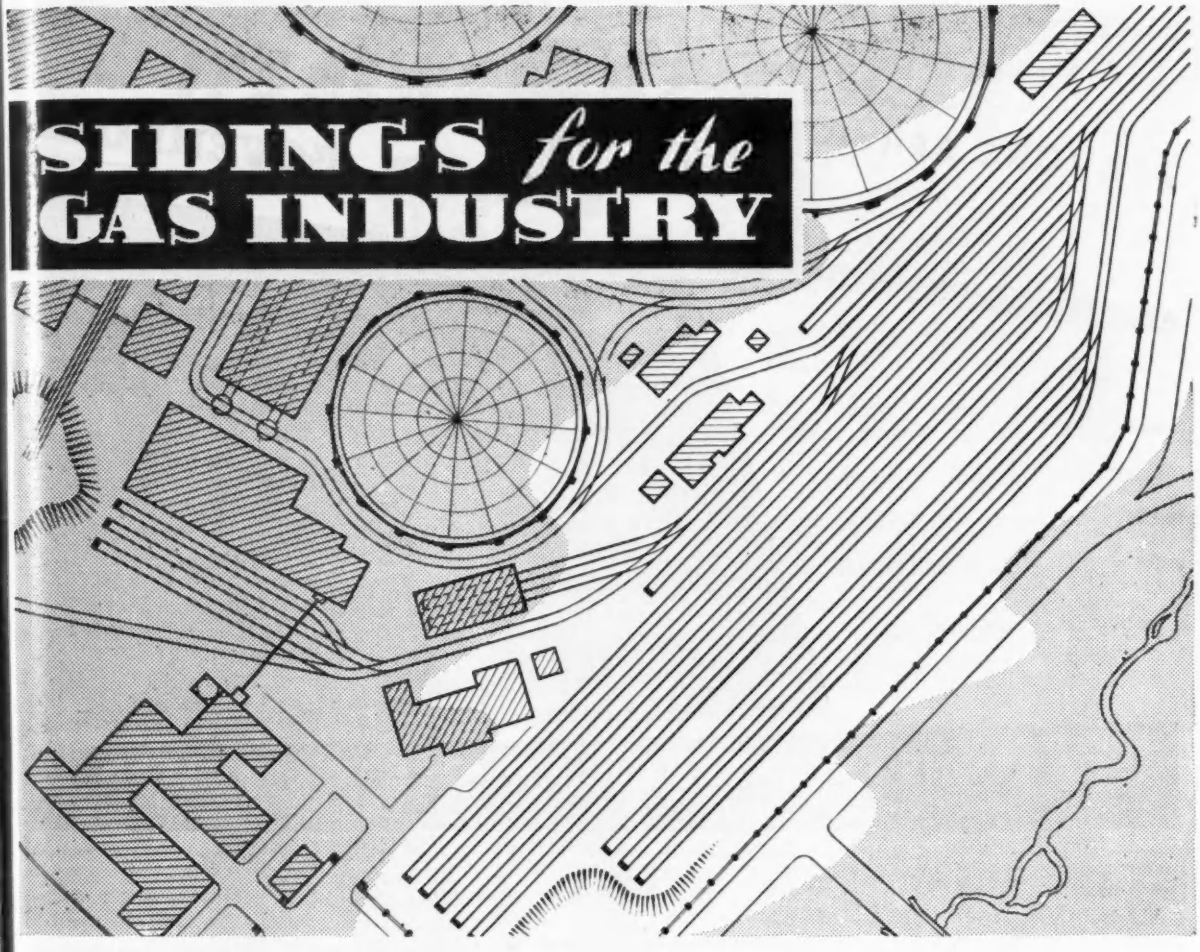

IN THE CONSTRUCTION of big sidings for major installations, or in the laying of a simple run-in for a small undertaking, Wards bring to the subject more than half a century's experience. Furthermore, because Wards' planned siding construction combines sound railway technique with this wide experience of operating conditions, there is a technical excellence about a Ward-built siding which makes for low operating costs and minimum maintenance charges.

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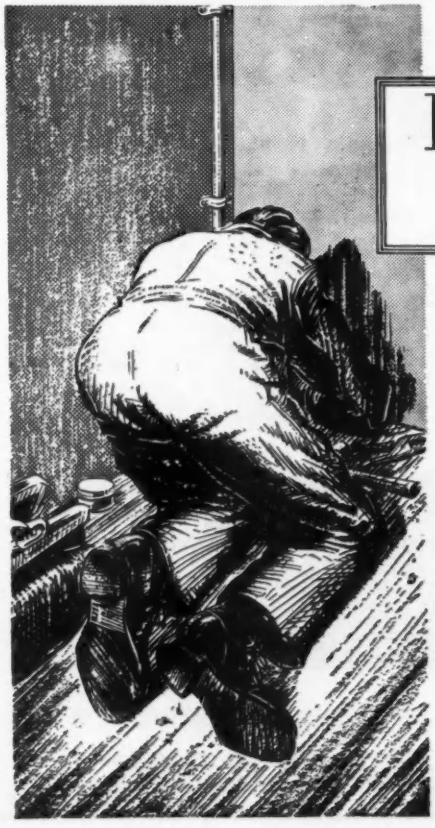

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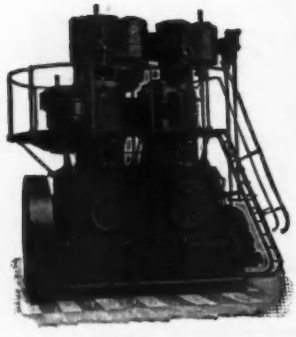
COMPRESSORS
& DRY VACUUM PUMPS
FOR AIR OR GAS.

* * *



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Capacities up to 10,000 cu. ft. per min.

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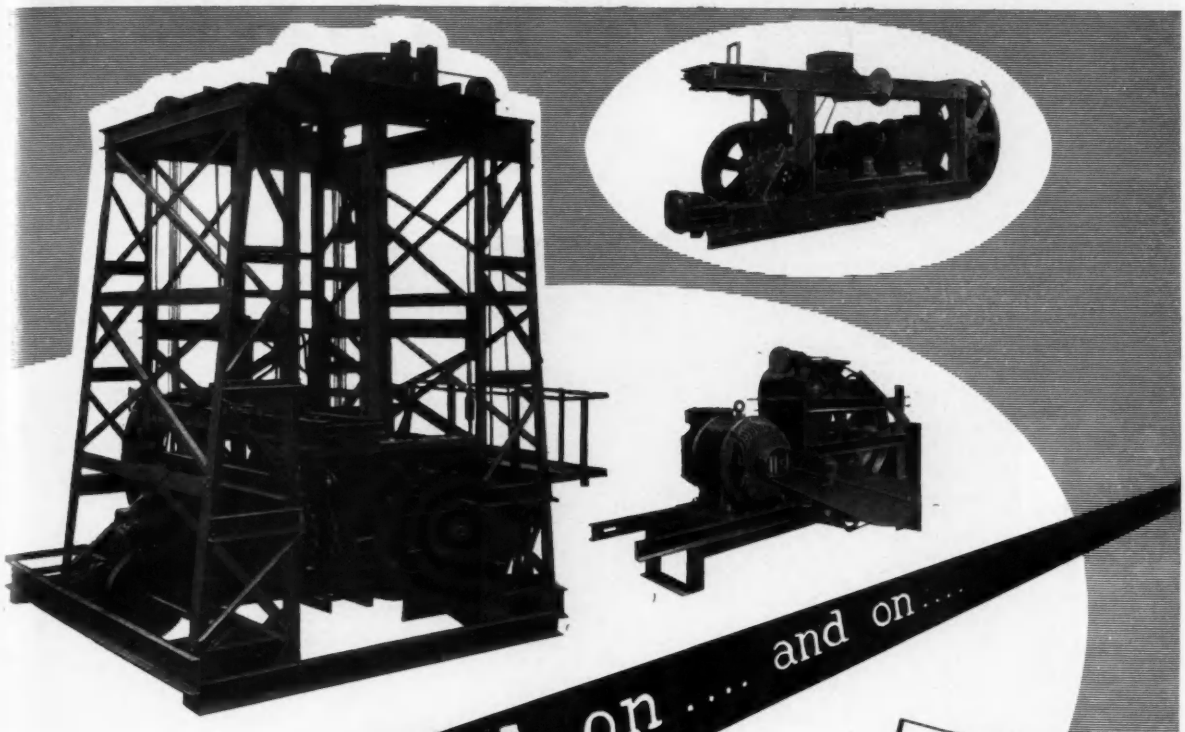

on .... and on .... and on ....

Proof—if proof be needed—of "R & B." leadership in design and construction, is the fact that in several reconstruction schemes, instead of being scrapped, "R. & B." machines have been transferred to other Retort Houses and Works. In one case a machine installed in 1923 was later transferred and is still working; in another a machine installed in 1935 was transferred in 1951.

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Stoking Machines

Ride & Bell Ltd. *RETFORD, NOTTS*

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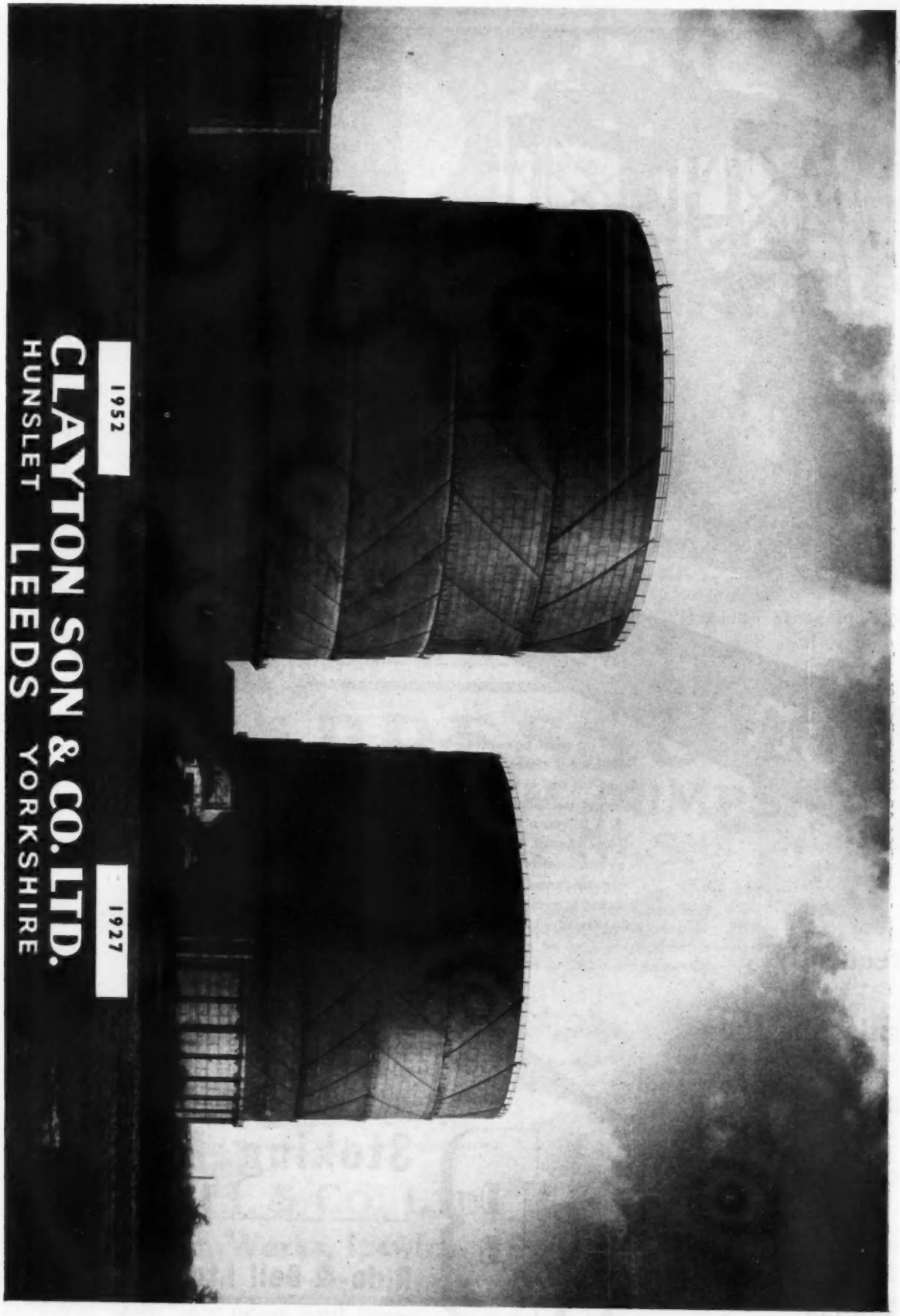
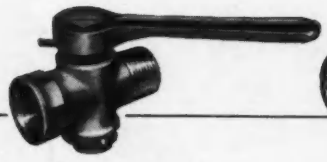
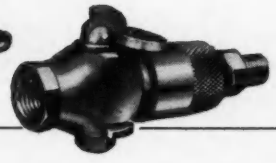

1952
CLAYTON SON & CO. LTD.
HUNSLET LEEDS YORKSHIRE
1927

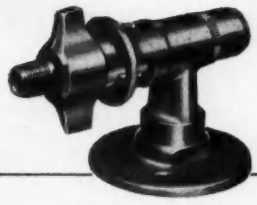
BRASSWORK



M & F Main Cock with Iron Key.

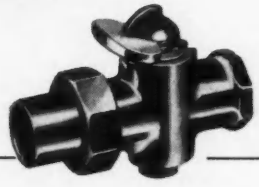


"Simflex" Drop Lever Cock with plug in Connector

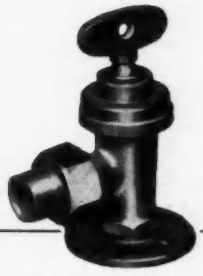


9044 SE Plug in Cock and Connector (Rubber Sleeve Joint)

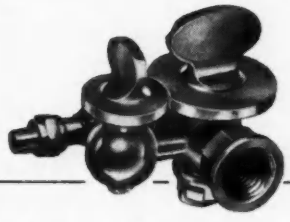
EXCLUSIVE



Union Cock with drop lever.



Gas Fire Cock with loose key, flanged for floor fixing.



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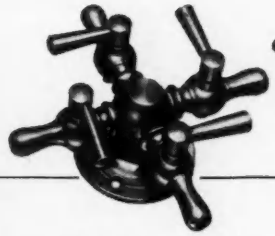
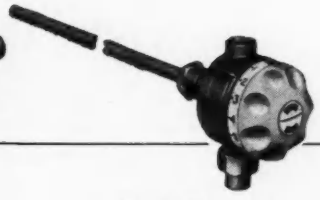
Constant Pressure Governor spring loaded for horizontal or vertical use



4 Way Laboratory Bench Cock, for Laboratory use.



Cooker Thermostat White plastic head with figures marked in black.

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These illustrations are typical of the wide range of fittings manufactured in bulk for leading industries at home and overseas. They embody the highest standards of design, workmanship, material and finish.

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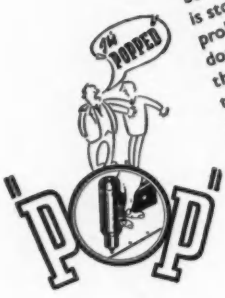

ONE OPERATOR OPERATION

'Pop' is a Registered Trade Mark of the manufacturers

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THE MODERN SYSTEM OF RIVETING

HOLDENS

VISCO STEELSHELL *Water Coolers*

cut Cooling Water costs

If you use Mains water for cooling diesels compressors, etc., you can cut down your water consumption about 97 per cent. by installing a "Visco" Steelshell Water Cooler. With this there is no waste as when Mains water is used once only, and run to waste. When space at ground level is not available, this unit can be placed on the roof, or mounted on a steel frame well above the ground and the space beneath used for dumping fuel.

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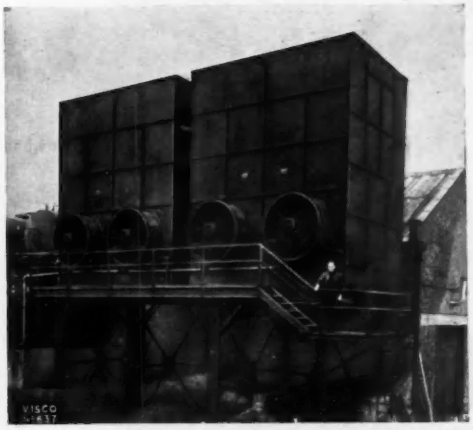

The above two coolers have a total capacity of 30,000 g.p.h. and supply cold water *via* main and booster pumps to a battery of gramophone record presses and heat exchangers, and to the bituminous section of the Works.

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SEATS ENCLOSED AND PROTECTED FROM DUST AND DIRT IN BOTH OPEN AND CLOSED POSITIONS.
SIMPLE AND ROBUST IN CONSTRUCTION.
POSITIVE IN OPERATION.
NO INTERNAL OPERATING MECHANISM EXPOSED TO GAS STREAM.
NO WEDGES OR SPRINGS.
CANNOT JAM—OPEN OR CLOSED.
SPINDLE CAN BE RE-PACKED IN THE OPEN OR CLOSED POSITION.
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INTERNAL OR EXTERNAL SCREW WITH OR WITHOUT INDICATOR.
CAN BE ADAPTED FOR UNDER-PRESSURE CONNECTIONS.
A HIGH PRESSURE VALVE AT A LOW PRESSURE PRICE.
SIZES 3" TO 24" HORIZONTAL AND VERTICAL

A low pressure High pressure Valve

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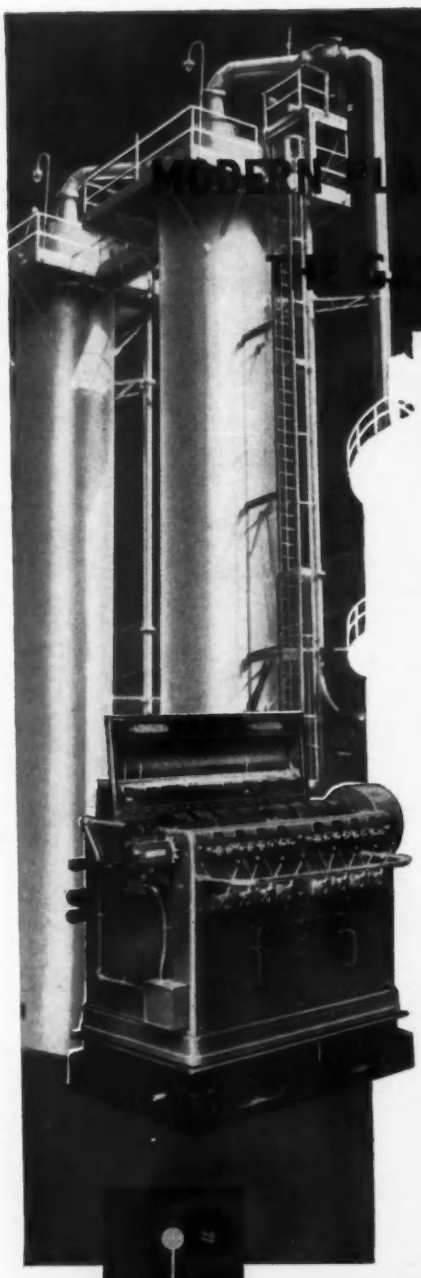
THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·



PGC ABP

As the coking coal resources of Britain diminish and petroleum derivatives become more easily available so P.G.C. and A.B.P. are prepared to meet changing requirements of the Gas Industry.

- The SEGAS Catalytic Oil Gas Process for use of heavy oil.
- Catalytic Reforming of refinery and natural gas.
- Enrichment of carburetted water gas with heavy oil.
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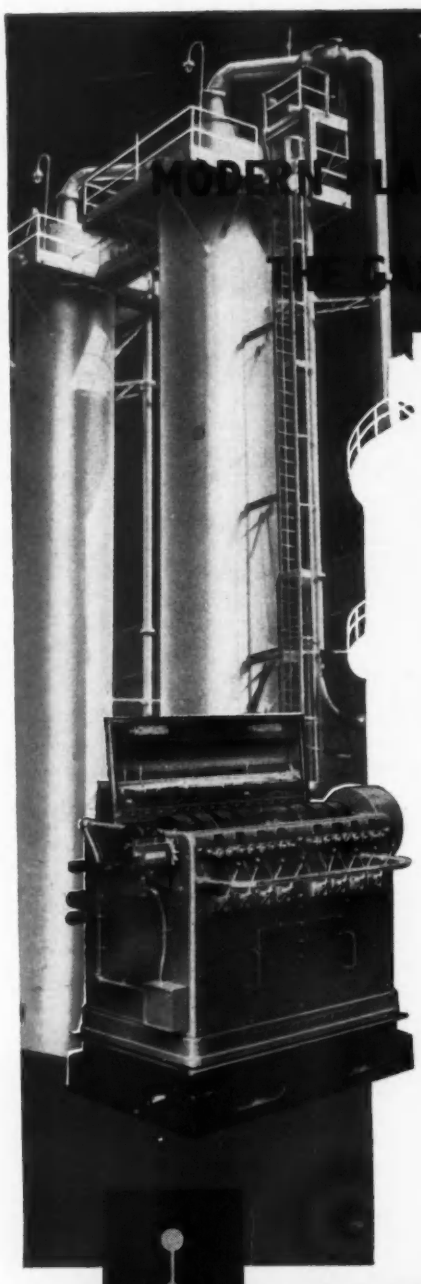

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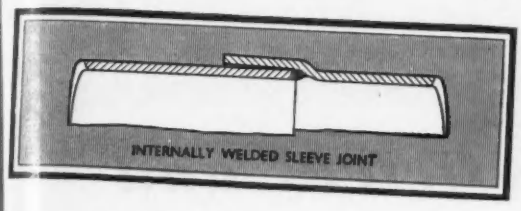
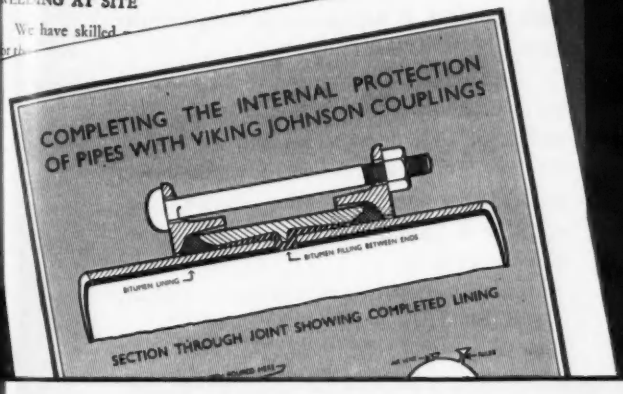
WELDED JOINTS



The internally welded short sleeve joint is a recent development for buried water mains. The lower limit of size is 30 inch bore, fixed by the space necessary to do the welding. Internal welding not only provides adequate strength, but also permits welding to be done "under cover" in all types of weather, and, where pipes are buried, without the necessity of making large "bell" holes or of welders working under adverse conditions and in difficult positions underneath the pipes. Further, it provides a ready and convenient means of pressure testing each joint, if desired, without having to fill a long stretch of pipeline with water. The joint permits adjacent pipes to be laid at a slight angle—up to about 2°.

WELDING AT SITE

We have skilled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BITUMEN LINING
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NEW EDITION

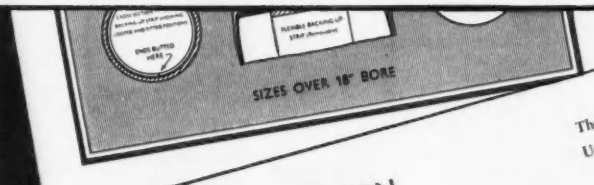
S&L SECTION 'M' CATALOGUE

This catalogue tells an engineer all he needs to know about steel mains for water, gas, sewage and air. Copies are available from 41 Oswald Street, Glasgow, C.1

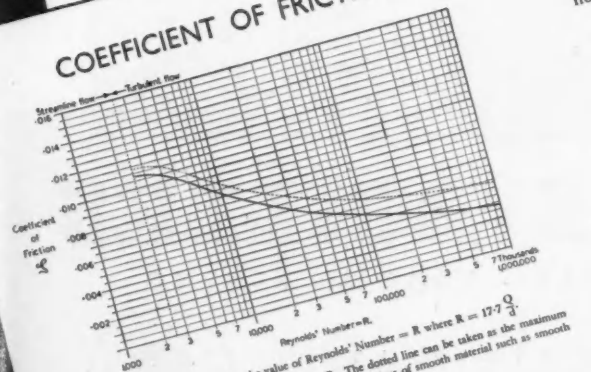
STEWARTS AND LLOYDS LIMITED

GLASGOW • BIRMINGHAM • LONDON

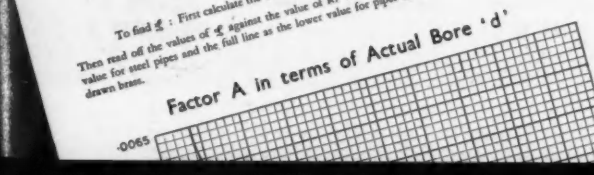
The largest manufacturers of steel tubes in Europe



COEFFICIENT OF FRICTION



To find $\mathcal{L}$: First calculate the value of Reynolds' Number = R where $R = 17{\cdot}7\frac{Q}{d}$. Then read off the values of $\mathcal{L}$ against the value of R. The dotted line can be taken as the maximum value for steel pipes and the full line as the lower value for pipes of smooth material such as smooth drawn brass.



The graph opposite gives the values of A for the usual range of d.

Unwin's formula is

$$q = \cdot 76\sqrt{\left[\frac{d^5}{d+1{\cdot}714}\cdot\frac{P_1^2-P_2^2}{LU}\right]} \text{ Cu. ft./sec.} \quad \ldots\ldots(1)$$

from which any of the variables can be determined if the others are known.

To find the initial or final absolute pressures, the formula can be written

$$P_1 = \sqrt{\left[P_2^2+1{\cdot}75\,q^2\,LU\left(\frac{d+1{\cdot}714}{d^5}\right)\right]} \quad \ldots\ldots(2)$$

$$P_2 = \sqrt{\left[P_1^2-1{\cdot}75\,q^2\,LU\left(\frac{d+1{\cdot}714}{d^5}\right)\right]} \quad \ldots\ldots(3)$$

while if the diameter is to be found, a close approximation is

$$d = \sqrt[5]{M}\left(\frac{1{\cdot}37+\sqrt{M}}{1{\cdot}433+\sqrt{M}}\right) \quad \ldots\ldots(4)$$

where $M = \frac{1{\cdot}75\,q^2\,LU}{P_1^2-P_2^2}$

for all values of d not less than 3.

Lacey's modification of Unwin's formula is

$$Q = 182\sqrt{\left[\frac{d^5(P_1^2-P_2^2)}{\mathcal{L}\,LU}\right]} \text{ Cu. ft./hr.} \quad \ldots\ldots(5)$$

or

$$q = 45{\cdot}05\sqrt{\left[\frac{d^5(P_1^2-P_2^2)}{\mathcal{L}\,LU}\right]} \text{ Cu. ft./sec.} \quad \ldots\ldots(6)$$

where $\mathcal{L}$ is the coefficient of friction, to be read from the appropriate curve opposite for the value of Reynolds' number, R, given by $R = 17{\cdot}7\frac{Q}{d}$.

The lower curve may be taken as the lower limit for practical purposes, the dotted line is that determined by Lacey for cast iron pipes. In the absence of data entitling a smaller value of $\mathcal{L}$ to be used the dotted curve may also be applied to steel pipes.

The above formula can be applied directly to single mains if P_1, P_2, or L is to be found but if d, v and Q are unknown an approximate value must be assumed and checked above, and corrected as necessary. Such an initial value can be found from Unwin's formula if Lacey's is preferred for final use.

Meaning of Symbols

Q = flow at atmospheric pressure, cubic feet per hour.

q = flow at atmospheric pressure, cubic feet per second.

U = specific gravity of gas relative to air as unity.

d = bore of pipe, in inches.

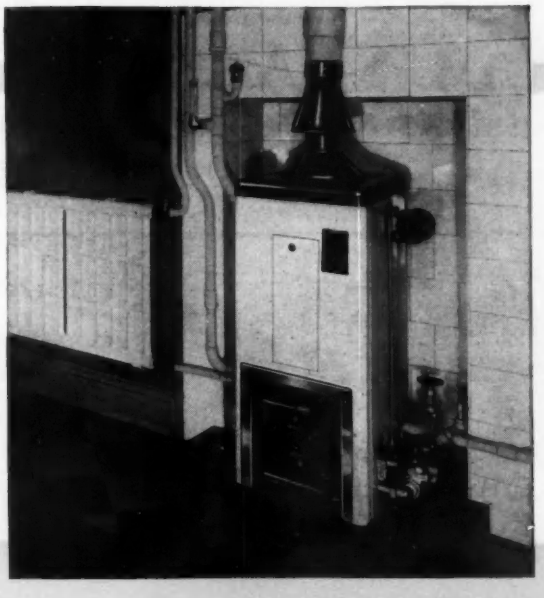
This illustrates the No. 1-GBB Series Boiler with cream and black stove-enamelled jacket, available in six sizes from 26,000 to 142,000 B.T.U. per hour. The interior shows a No. 1-GBB-3 Boiler situated in a private residence.

For efficient and lasting service...

To burn gas efficiently for the production of hot water, either for domestic purposes or central heating, demands a Boiler specially designed for the purpose. Over a period of 20 years we have developed a series of Boilers, each of which is unequalled in its particular field.

All Boilers are equipped with a complete set of thermostatic controls, and have insulated jackets of steel or aluminium in appropriate finishes. 'Ideal' Gas Boilers, of which several thousands a year are being installed, are available in 22 sizes from 20,000 to 1,430,000 B.T.U. per hour.

An illustrated booklet giving full details is available on request.



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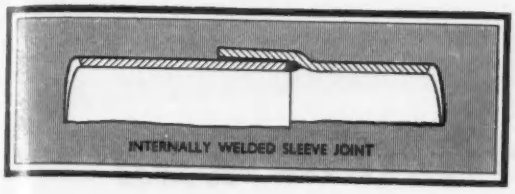
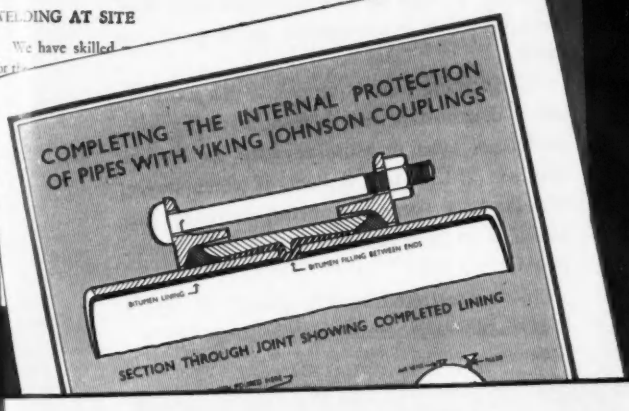
WELDED JOINTS



The internally welded short sleeve joint is a recent development for buried water mains. The lower limit of size is 30 inch bore, fixed by the space necessary to do the welding. Internal welding not only provides adequate strength, but also permits welding to be done "under cover" in all types of weather, and, where pipes are buried, without the necessity of making large "bell" holes or of welders working under adverse conditions and in difficult positions underneath the pipes. Further, it provides a ready and convenient means of pressure testing each joint, if desired, without having to fill a long stretch of pipeline with water. The joint permits adjacent pipes to be laid at a slight angle—up to about 2°.

WELDING AT SITE

We have skilled [illegible] for the


COMPLETING THE INTERNAL PROTECTION OF PIPES WITH VIKING JOHNSON COUPLINGS
BITUMEN LINING
BITUMEN FILLING BETWEEN ENDS
SECTION THROUGH JOINT SHOWING COMPLETED LINING

S&L

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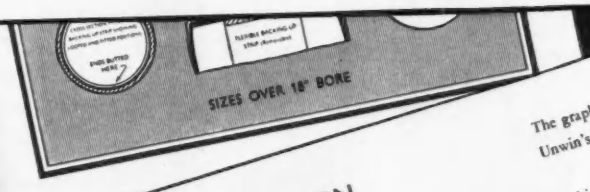


The graph opposite gives the values of A for the usual range of d.

Unwin's formula is

$$q = 76 \sqrt{\left[\frac{d^5}{d+1{\cdot}714} \cdot \frac{P_1^2 - P_2^2}{LU}\right]} \text{ Cu. ft./sec.} \quad \ldots\ldots(1)$$

from which any of the variables can be determined if the others are known.

To find the initial or final absolute pressures, the formula can be written

$$P_1 = \sqrt{\left[P_2^2 + 1{\cdot}75\, q^2\, LU\left(\frac{d+1{\cdot}714}{d^5}\right)\right]} \quad \ldots\ldots(2)$$

$$P_2 = \sqrt{\left[P_1^2 - 1{\cdot}75\, q^2\, LU\left(\frac{d+1{\cdot}714}{d^5}\right)\right]} \quad \ldots\ldots(3)$$

while if the diameter is to be found, a close approximation is

$$d = \sqrt[5]{M}\left(\frac{1{\cdot}37 + \sqrt[5]{M}}{1{\cdot}403 + \sqrt[5]{M}}\right) \quad \ldots\ldots(4)$$

where $M = \frac{1{\cdot}75\, q^2\, LU}{P_1^2 - P_2^2}$

for all values of d not less than 3.

Lacey's modification of Unwin's formula is

$$Q = 182 \sqrt{\left[\frac{d^5(P_1^2 - P_2^2)}{\mathfrak{L} LU}\right]} \text{ Cu. ft./hr.} \quad \ldots\ldots(5)$$

or

$$q = \cdot 0505 \sqrt{\left[\frac{d^5(P_1^2 - P_2^2)}{\mathfrak{L} LU}\right]} \text{ Cu. ft./sec.} \quad \ldots\ldots(6)$$

where $\mathfrak{L}$ is the coefficient of friction, to be read from the appropriate curve opposite for the value of Reynolds' number, R, given by $R = 17{\cdot}7\frac{Q}{d}$.

The lower curve may be taken as the lower limit for practical purposes, the dotted line is that determined by Lacey for cast iron pipes. In the absence of data entitling a smaller value of $\mathfrak{L}$ to be used the dotted curve may also be applied to steel pipes.

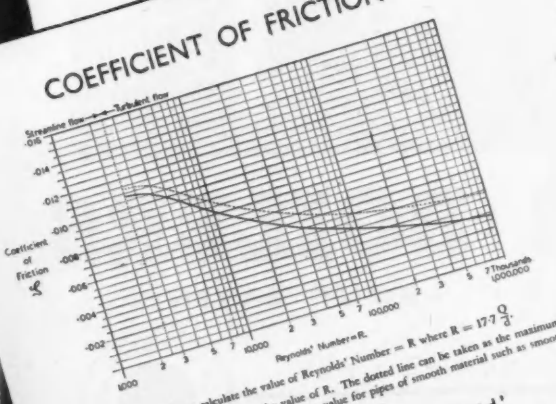
The above formula can be applied directly to single mains if P_1, P_2, or L is to be found but if d, v and Q are unknown an approximate value must be assumed and checked above, and corrected as necessary. Such an initial value can be found from Unwin's formula if Lacey's is preferred for final use.

Meaning of Symbols

Q = flow at atmospheric pressure, cubic feet per hour.
q = flow at atmospheric pressure, cubic feet per second.
U = specific gravity of gas relative to air as unity.

[illegible] of pipe, in inches.

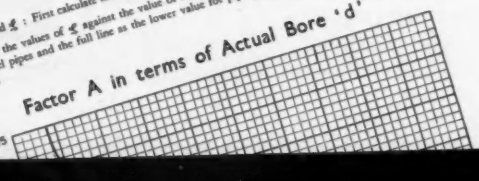
COEFFICIENT OF FRICTION



To find $\mathfrak{L}$: First calculate the value of Reynolds' Number = R where $R = 17{\cdot}7\frac{Q}{d}$.

Then read off the values of $\mathfrak{L}$ against the value of R. The dotted line can be taken as the maximum value for steel pipes and the full line as the lower value for pipes of smooth material such as smooth drawn brass.

Factor A in terms of Actual Bore 'd'



This illustrates the No. 1-GBB Series Boiler with cream and black stove-enamelled jacket, available in six sizes from 26,000 to 142,000 B.T.U. per hour. The interior shows a No. 1-GBB-3 Boiler situated in a private residence.

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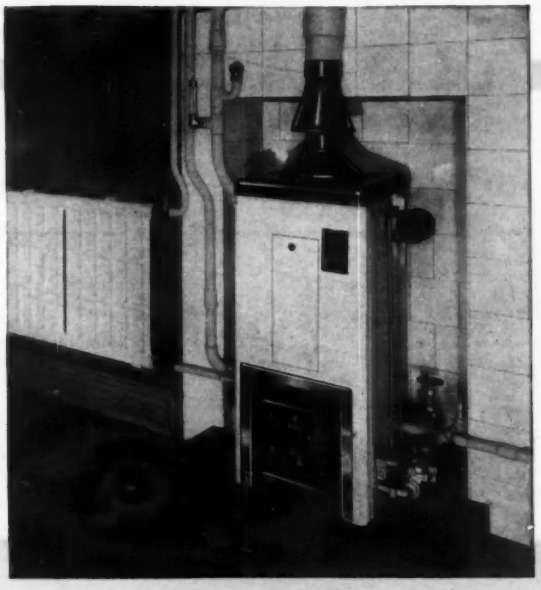

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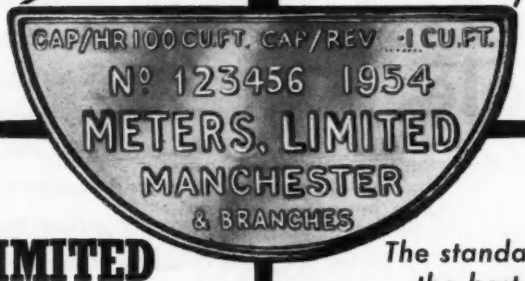

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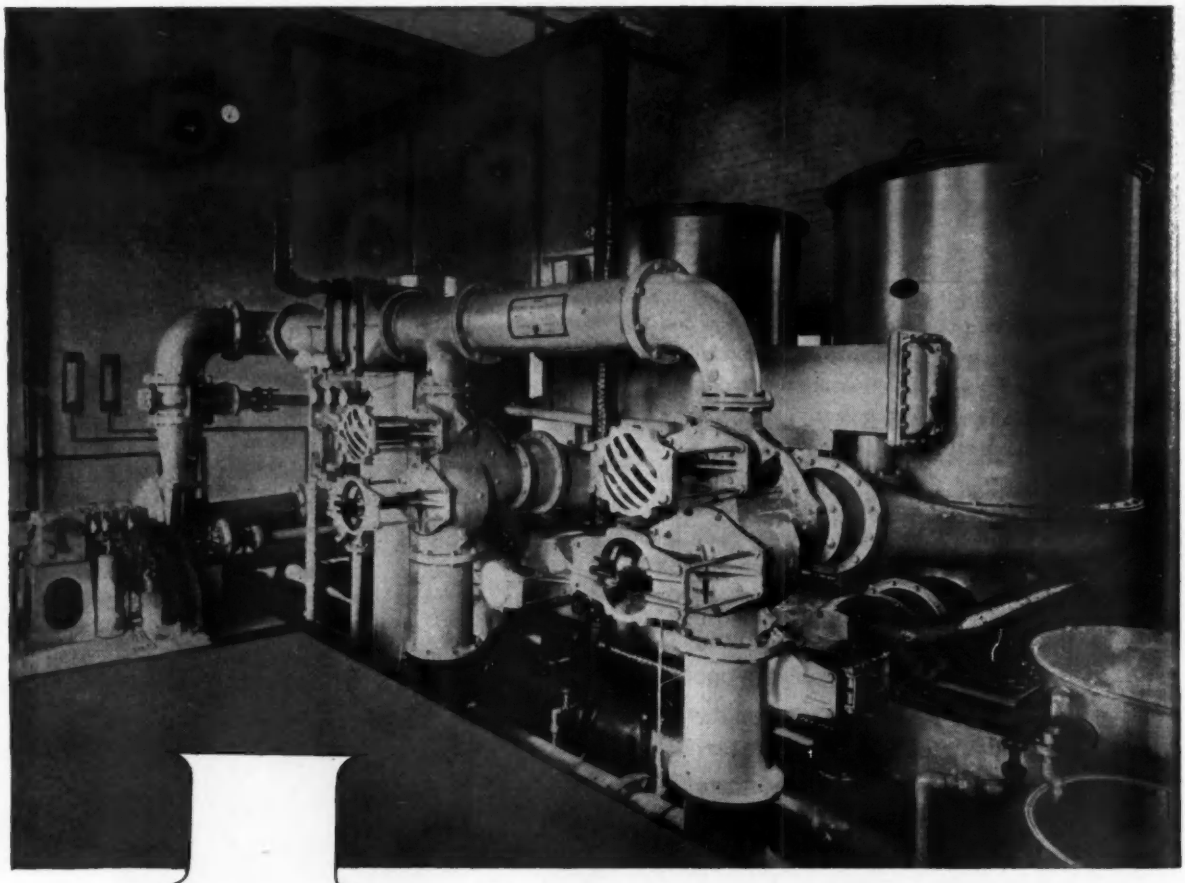

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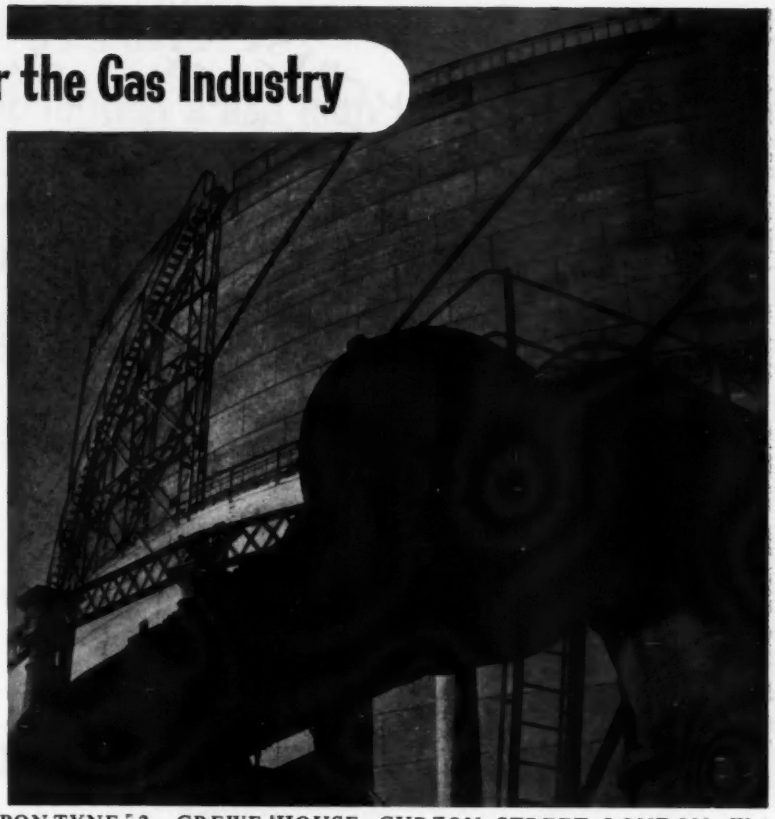

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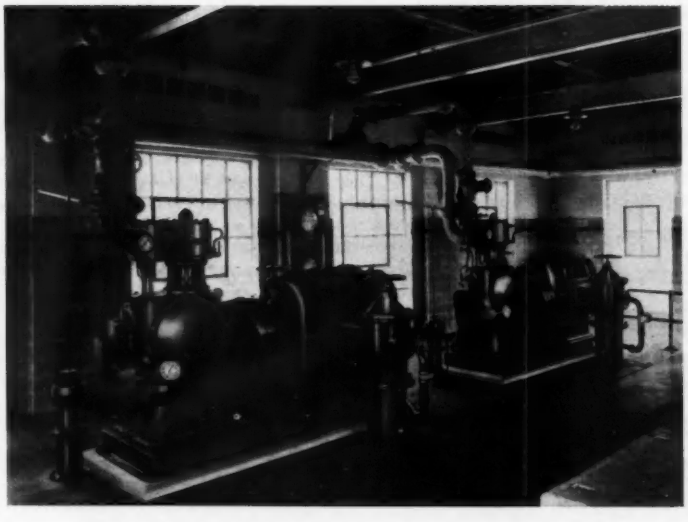

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(*b*) Remote indication of flow through volumetric governor into station.

(*c*) Remote control of flow into station.

(*d*) Remote indication of gasholder stocks, with audible and visible alarms for high and low limits.

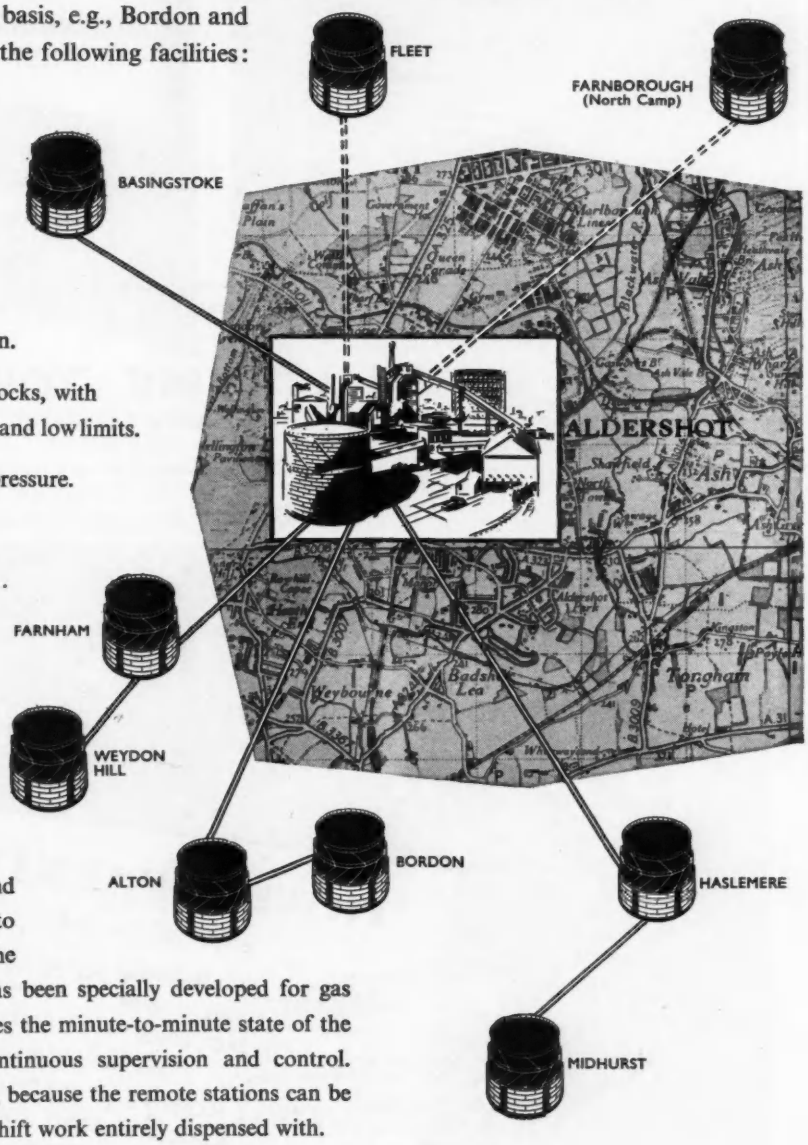
(*e*) Remote indication of the district pressure.

(*f*) Remote control (start/stop) and indication (running/stopped) of the station booster.

(*g*) Remote indication and alarm of electricity supply failure.

(*h*) Equipment testing facilities.

(*i*) Telephone communication.



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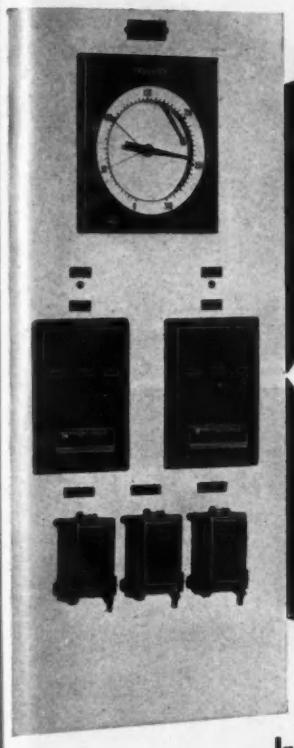

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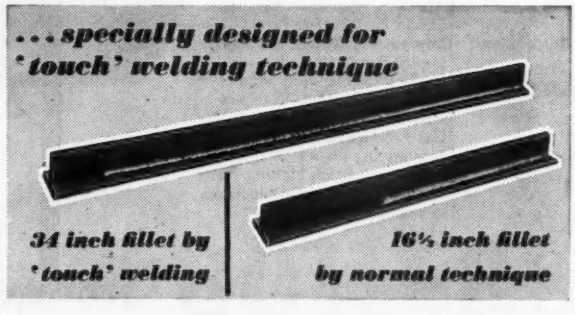

34 inch fillet by 'touch' welding

16½ inch fillet by normal technique

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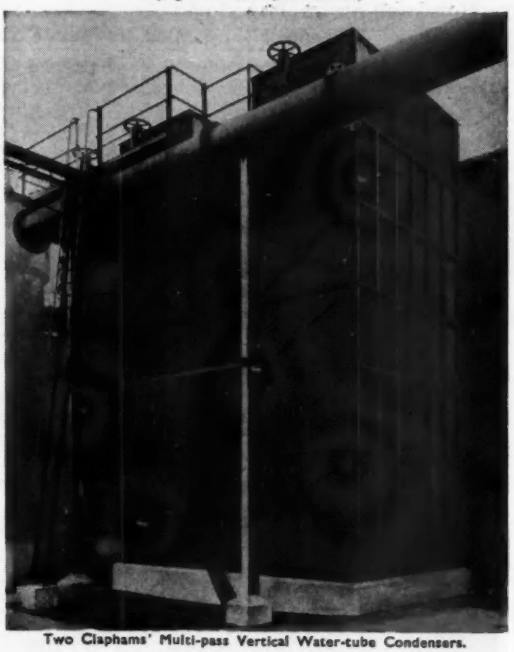
Two Clapham-Barwick Pumpless Static Ammonia Washers

Internal deck level view of the Purifier Installation. (Eight 45 Feet Square Boxes.)



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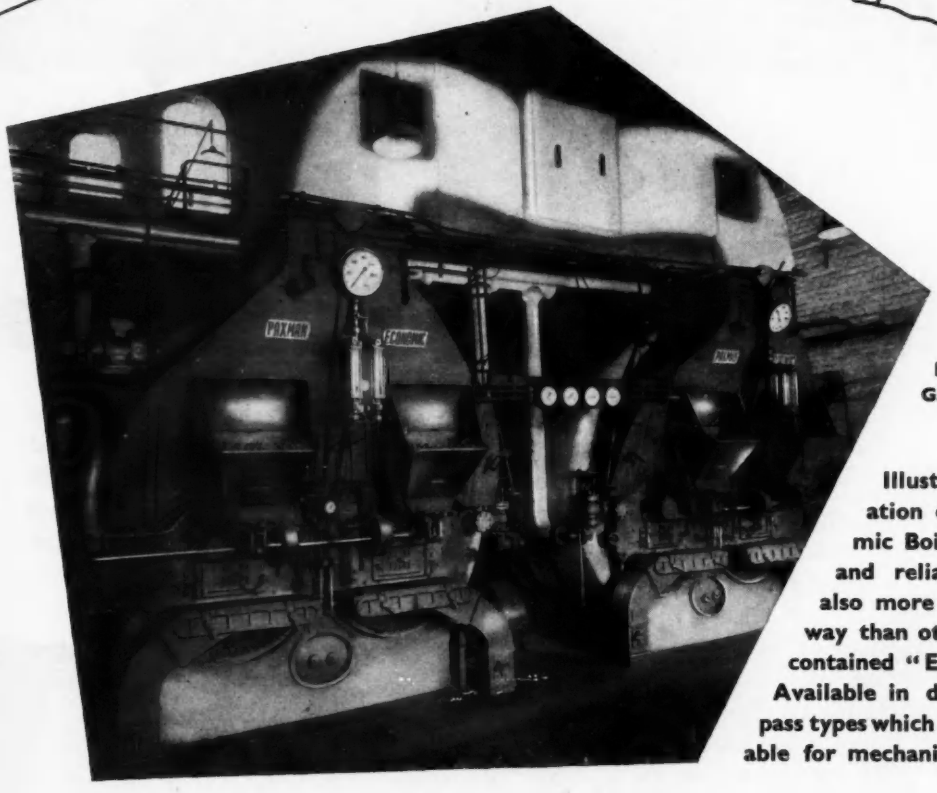

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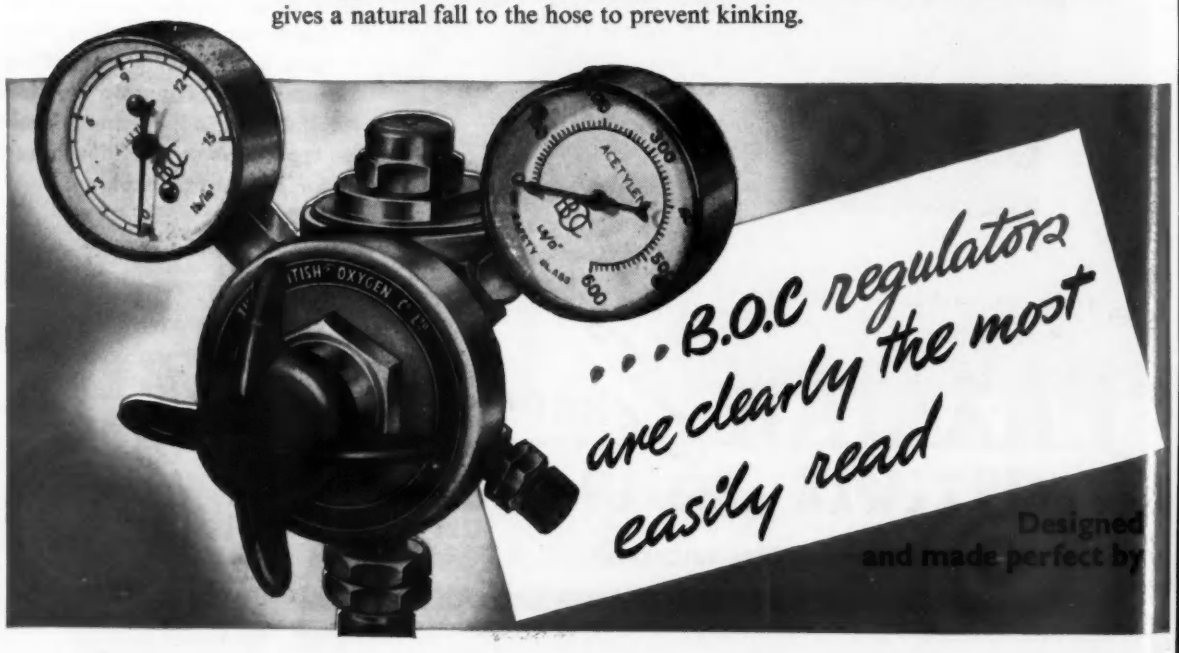

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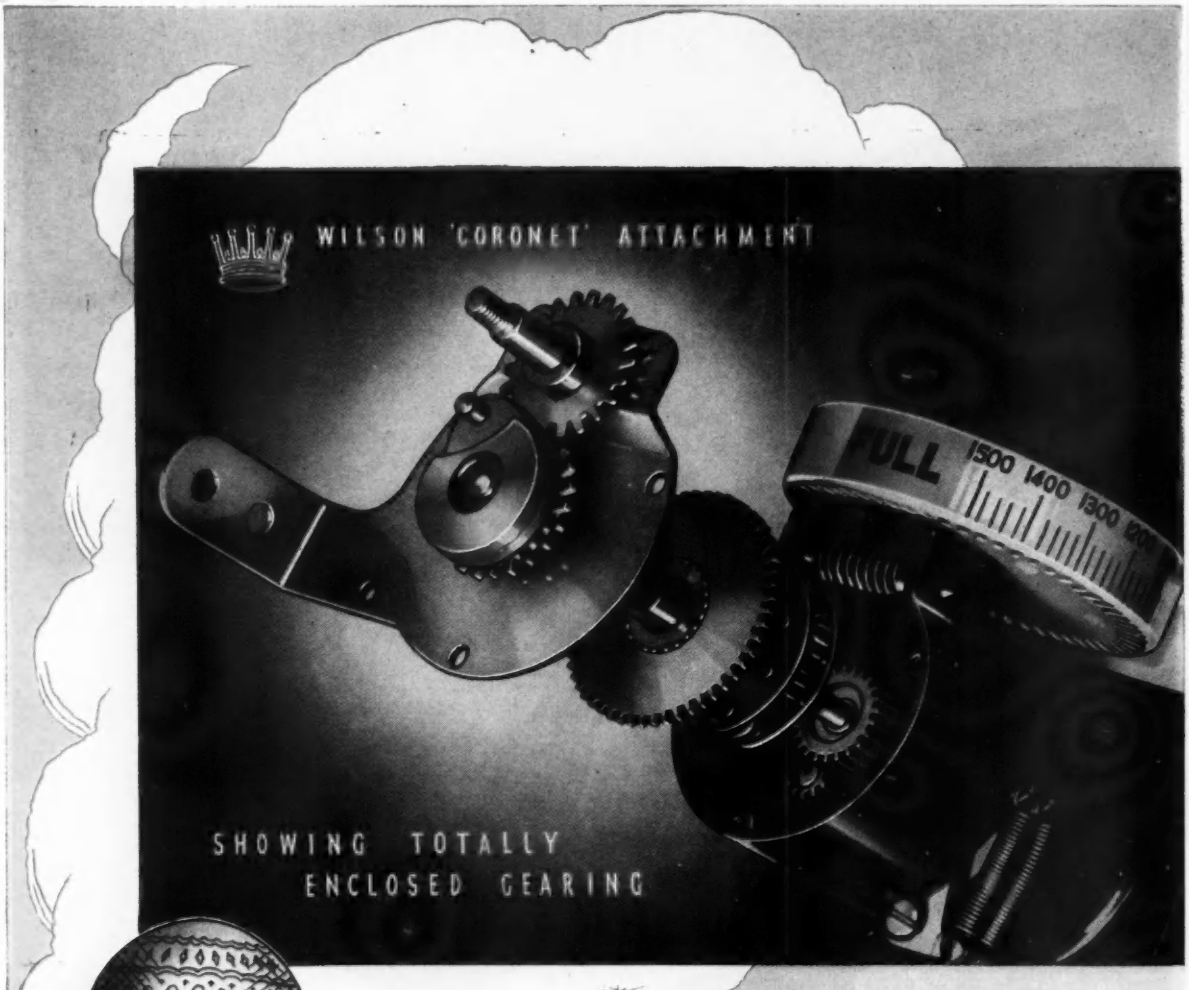

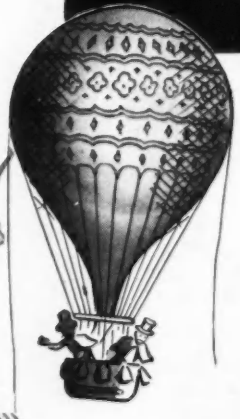

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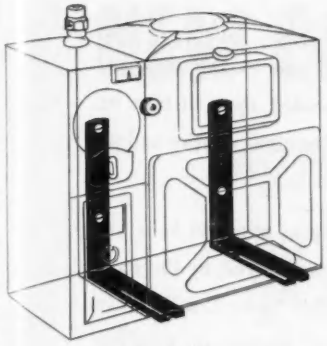

FIG G.L.84

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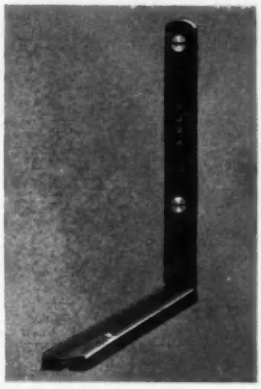

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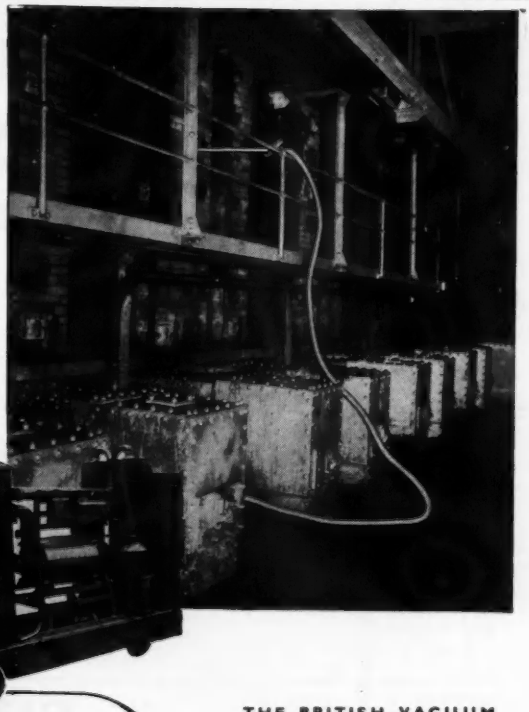
P.3944

HOT DUST AND ASH REMOVAL IN GAS WORKS

THE B.V.C. system of vacuum dust removal has been established in gas works throughout the country and is now generally recognised as the most efficient system for the purpose. Where portable machines are used a water cooler container allows the plant to handle the hot dust and ash from the top of retorts etc. and specially designed non-choking tools will take any volume of dust.

The illustration shows Redditch where a portable B.V.C. machine operates through an installed pipe system. Full particulars of these and other installations on request.



B.V.C BRITISH VACUUM CLEANER

INDUSTRIAL VACUUM CLEANERS

THE BRITISH VACUUM CLEANER & ENGINEERING CO. LTD.

Dept. 63/BH Goblin Works, Leatherhead, Surrey
Tel.: ASHtead 866..

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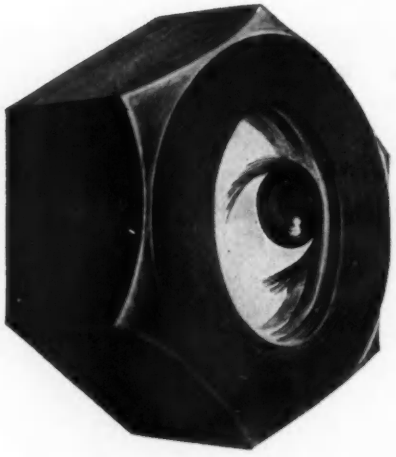

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by KIRK'S

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- **Oven flue vented through front of splash-plate.** This prevents walls being heat marked, and warms plates in double shelf rack.
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- **All hotplate parts lift off** for easy cleaning.
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Your customers may choose this handsome cooker in any of these fine vitreous enamel finishes. All white, all cream, eau-de-nil and cream, white and grey. They'll admire the Crusader's push-in type safety taps on the facia panel, the fingertip thermostat oven control and the fully equipped oven, finished in light grey enamel.

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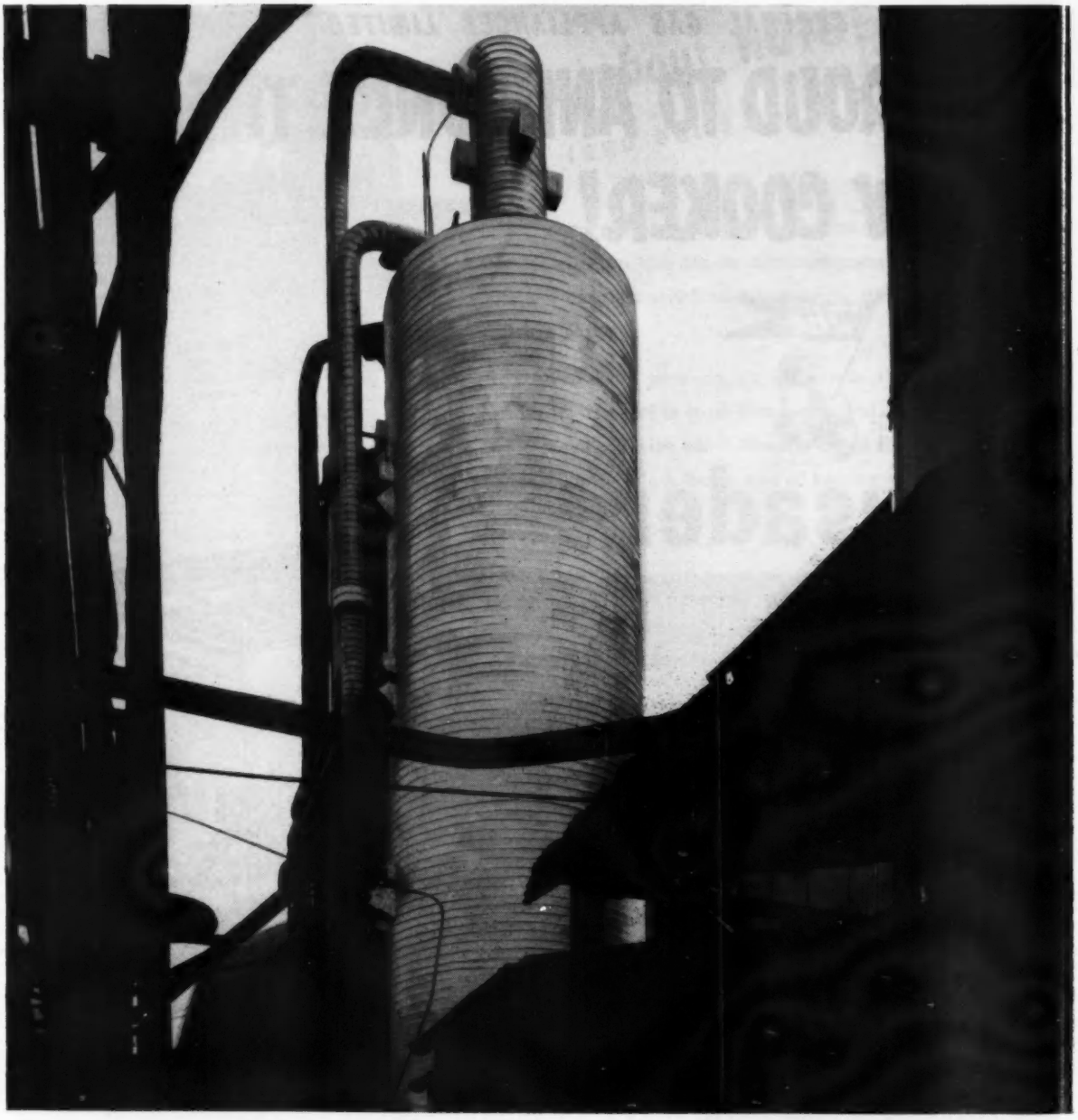
AUDENSHAW, MANCHESTER
Proprietors: Allied Ironfounders Ltd.



The photograph shows the insulation and protection of a 40ft. high liquid CO_2 storage vessel at a large Essex chemical works. The vessel is insulated with Onazote, which is externally finished with a bitumen compound, and finally wrapped with Aluminium painted DENSELT TAPE.

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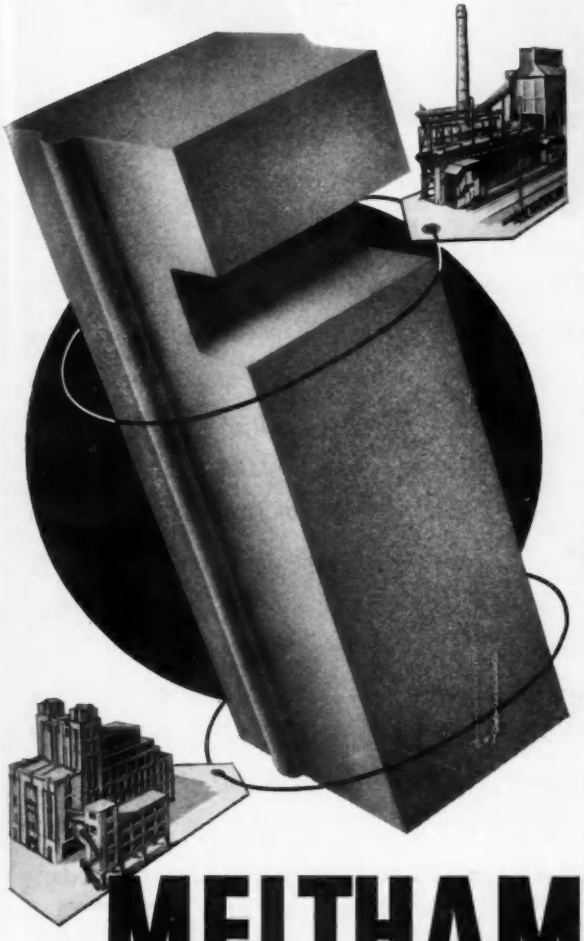

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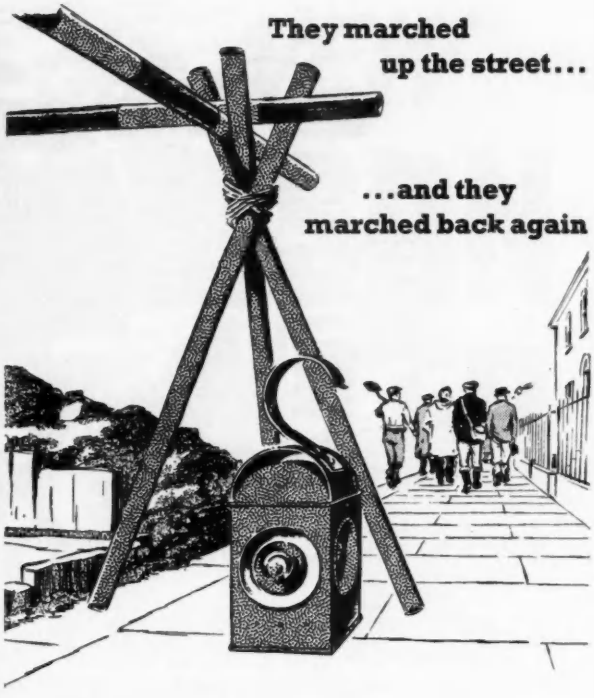

How often it has happened. A leak detected . . . the trench left open . . . waiting for leak clamps to be delivered for fitting. Little wonder that progressive undertakings today insist upon testing and repair gangs carrying C.P. Leak Clamps with their equipment. The result? Leak detected and repaired in one operation . . . *permanently* repaired because flexibility in the joint is provided for without any sacrifice of sealing efficiency. Remember—C.P. LEAK CLAMPS embody the experience and development which comes from having manufactured over 50,000 Clamps in this country.

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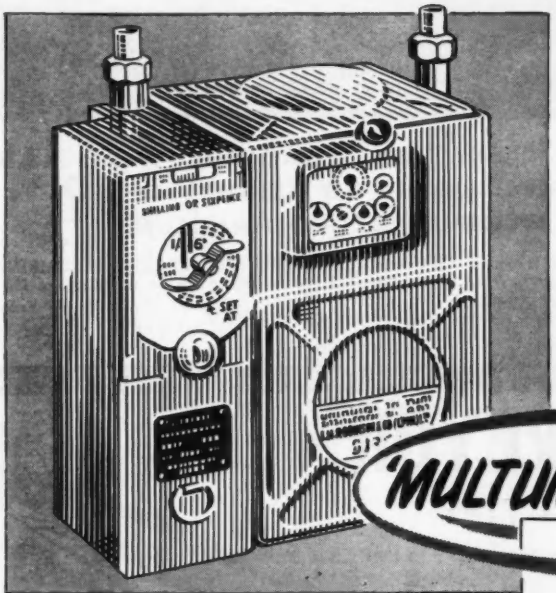
Announcing the NEW ROBINSON ·05 METER

. . . a saving in space and cost



We introduce the new ROBINSON · 05. Designed to cater for the needs of the industry. Smaller, and costs less. Conforms to the requirements of the I.G.E. specification for D.1. Range (100 cub. ft. per hr.) Radial valves. Stainless steel bearings. Enclosed gear box.

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Approved by the Ministry of Fuel and Power

	DIMENSIONS: ¾" connections		
	Overall Height	Overall Width	Depth Front to back
ORD.	10 21/32"	8 1/2"	6 1/8"
P.P.	10 21/32"	10 3/4"	6 1/8"

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UP TO 200 TONS PER HR.

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VARIABLE ELEVATION THROUGH WIDE RANGE STOCKPILING UP TO HEIGHTS OF 30FT. WITHOUT SECOND HANDLING

Illustration shows a 48 ft. centres × 24 in. belt HYLO-VEYOR LOBAND-LOADER COMBINATION transferring washed slack direct from tipping truck to railway waggon at the rate of 150 T.P.H. FIXED CONVEYORS can also be supplied. Power units can be electric motor, petrol or Diesel engine. Please apply for our new General Conveyor Folder. CF/43

WE MANUFACTURE PORTABLE CONVEYORS from 20FT. to 62FT. CENTRES GIVING DISCHARGE HEIGHTS UP TO 30FT.

'M.A.' type CONVEYOR

A LARGE RANGE DISCHARGE HEIGHT TYPE WITH HYDRAULIC JACKING.

This highly mobile and robust machine is available in 30 ft. and 36 ft. centres giving variable elevations from 7 ft. 3 in. to 15 ft. 6 in. and 7 ft. 10 in. to 18 ft. respectively. Electric motor, Petrol or Diesel engine drive.

CAPACITIES *up to* **120 TONS PER HOUR** *on materials at* **50 lbs per cu. ft.** This Conveyor can be used in conjunction with the Loband Loader.

C.H. JOHNSON (Machinery) LTD., CF/43 **ADSWOOD, STOCKPORT, Ches.**

PHONE: STO 2642/5 GRAMS: 'Machinery' Stockport Also at LONDON (Prospect 7671) GLASGOW (Kilmacolm 558).

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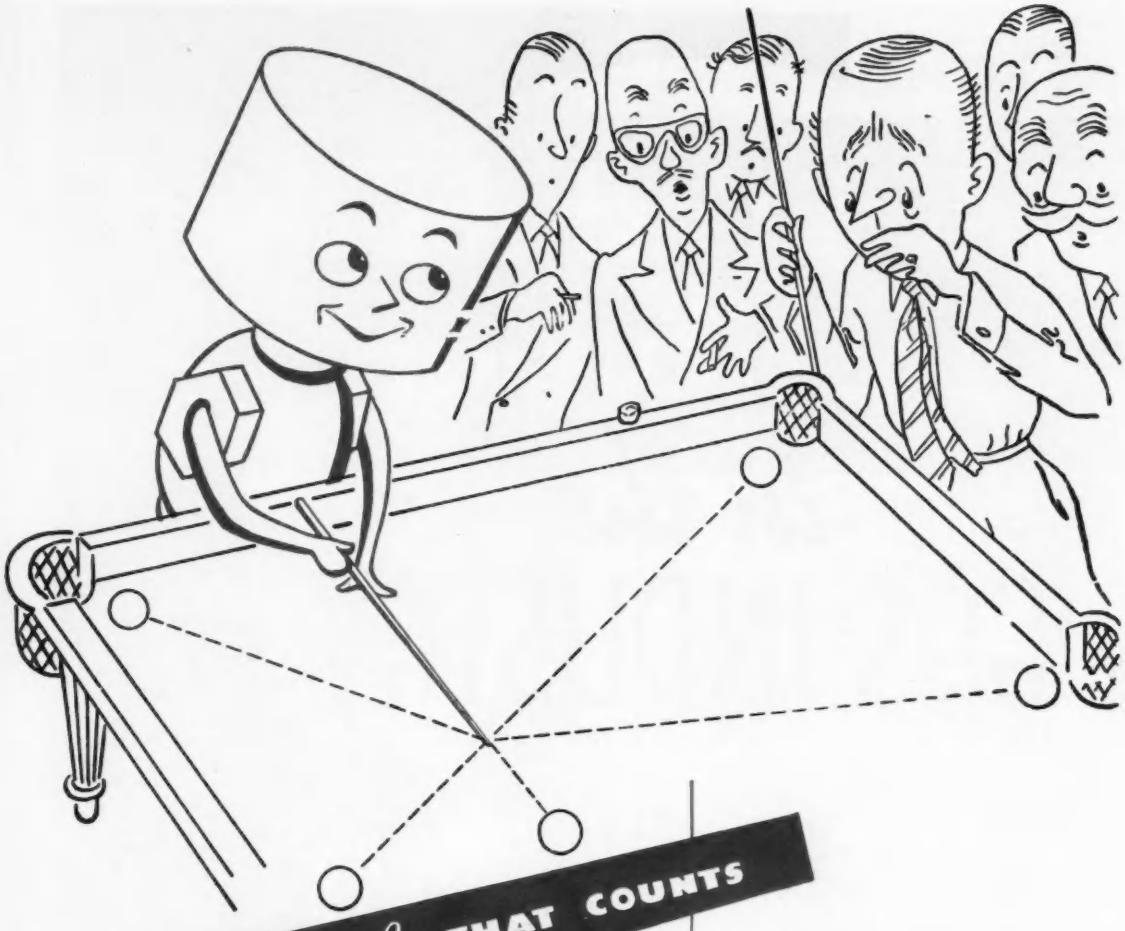

IT'S *control* THAT COUNTS

The skill of the expert, with lots of experience behind it . . . that is what produces the control you find in Magnetic Valves. Really close and dependable control, what's more—whether automatic or remote, whether of water, steam, coal gas, oil, air or other industrial liquids and gases, and all without glands, stuffing-boxes or driving-shafts. Let us send you our catalogue, showing the full range of Magnetic Valves up to 12" orifice.

SPECIAL VALVES DESIGNED if required.
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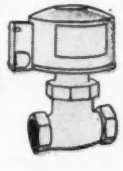
This valve is of the shut-off pattern and is suitable for passing water, air, saturated steam, oil, gas, etc., at pressures from 10 to 250 lbs. per sq. in. and higher if required.



A flame proof solenoid housing, Buxton Certified, can be fitted where required.

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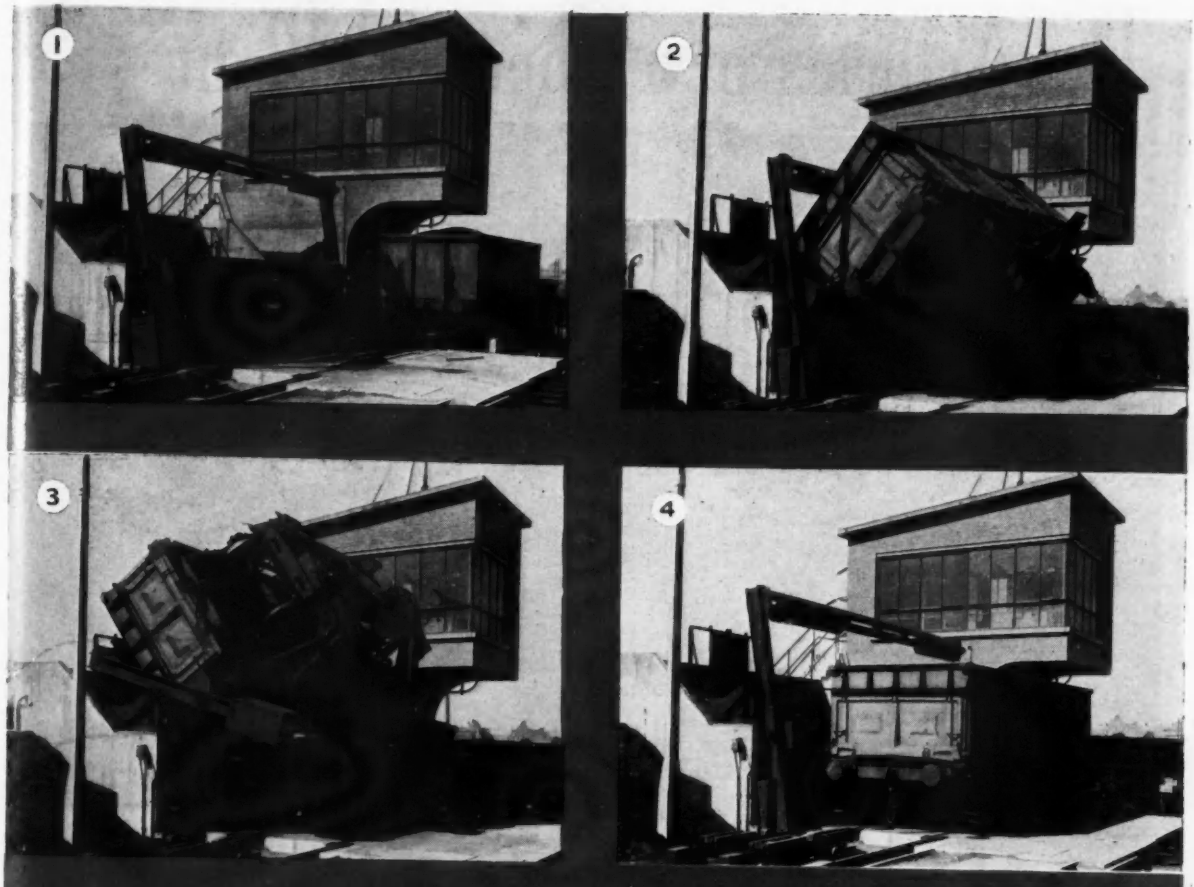

One minute in the life of a tippler

The side-discharge tippler was first introduced by Mitchells and machines of this type are still unequalled in design and efficiency. They can handle all sizes, conditions, and types of wagon without adjustment of any kind, and at a greater speed than any other design.

The load is discharged to the side of the track, clear of loading gauge, so that the coal can be grabbed or handled in any way without interfering with normal rail traffic. Side-discharge tipplers can deal with wagons up to 65 tons net load and smaller wagons can be unloaded at rates of up to 60 wagons an hour.

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Mitchells have been installing tipplers for more than 30 years at power stations, steel works, collieries—in fact anywhere where large loads of raw materials or fuel have to be handled quickly. Mitchells also specialize in wagon tippler hoists and locomotive coaling plant.

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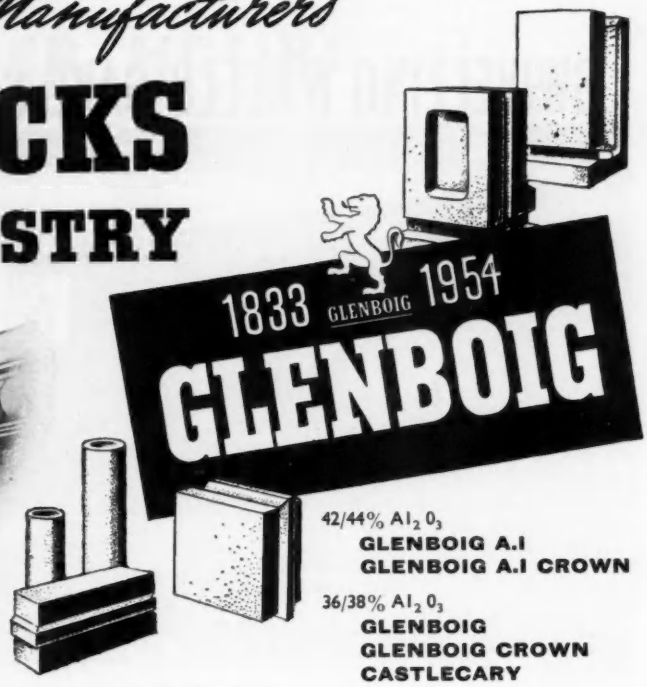

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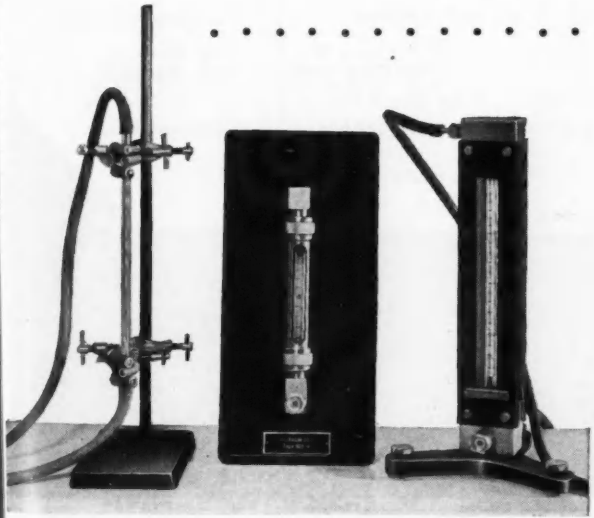
. . . . . *Measuring*

Rate of flow

in the laboratory



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The ready availability of accurate but inexpensive ROTAMETER flowmeters is greatly assisting the efficient working of many modern laboratories. Apart from their value in research work with its ever-changing needs, ROTAMETERS are widely applied to routine standard tests. The typical laboratory ROTAMETERS shown would, for example, be suitable for :

Control of inert atmosphere for vacuum distillation—B.S. 598-1940.

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Determination of carbon monoxide—Adams and Simmons, J.C.I., vol. 1, 1951 (N.C.B.)

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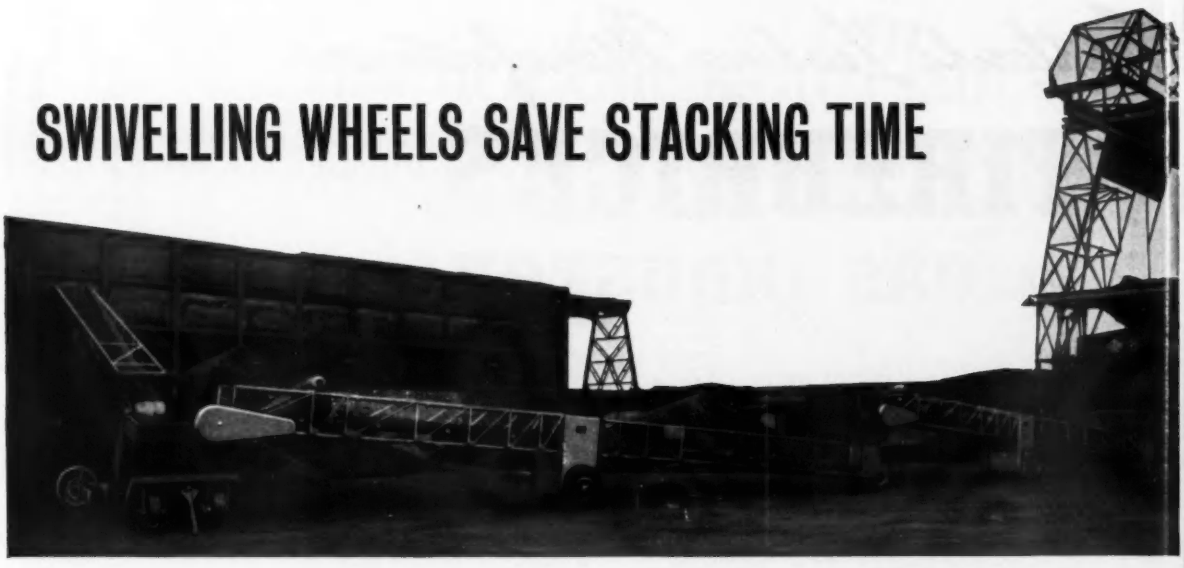
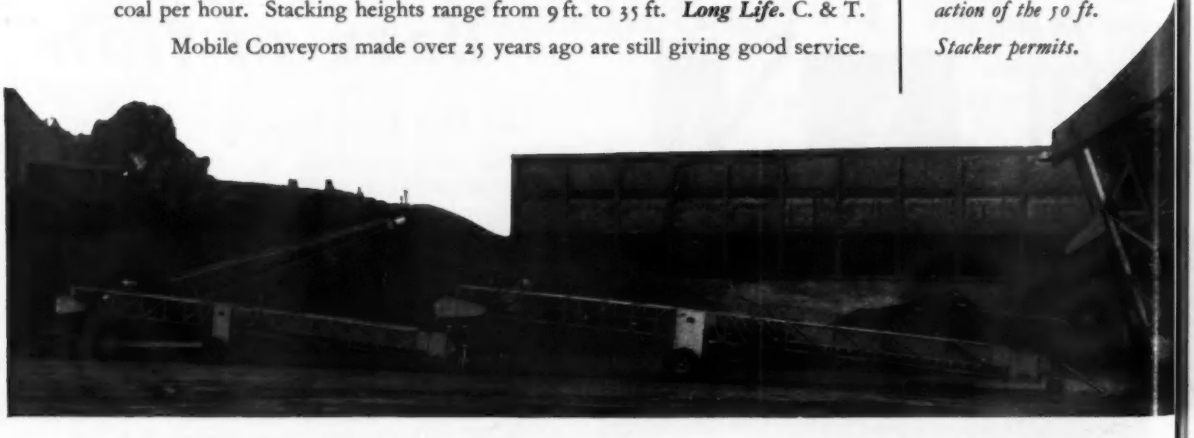
SWIVELLING WHEELS SAVE STACKING TIME



No need to waste time changing the position of the horizontal feed conveyors when stacking with C. & T. Super-Mobile Stackers. When a new discharge point becomes necessary the Stacker alone is moved. Its swivelling main wheels permit a radial movement of the discharge point without alteration of the feed point and this feature enables large stacks to be built up with the minimum possible movement of conveyors. Other outstanding features of C. & T. Stackers are:—

High Mobility. They are instantly available for towing any distance along the highway. ***Wide Capacity Range.*** C. & T. standard machines are built in a number of types with capacity ranging from 50 to 300 tons of coal per hour. Stacking heights range from 9 ft. to 35 ft. ***Long Life.*** C. & T. Mobile Conveyors made over 25 years ago are still giving good service.

In each of the adjoining photographs, the two 50 ft. C. & T. Horizontal Conveyors are seen to be in the same position, but note the wide area of discharge which the radial traversing action of the 50 ft. Stacker permits.



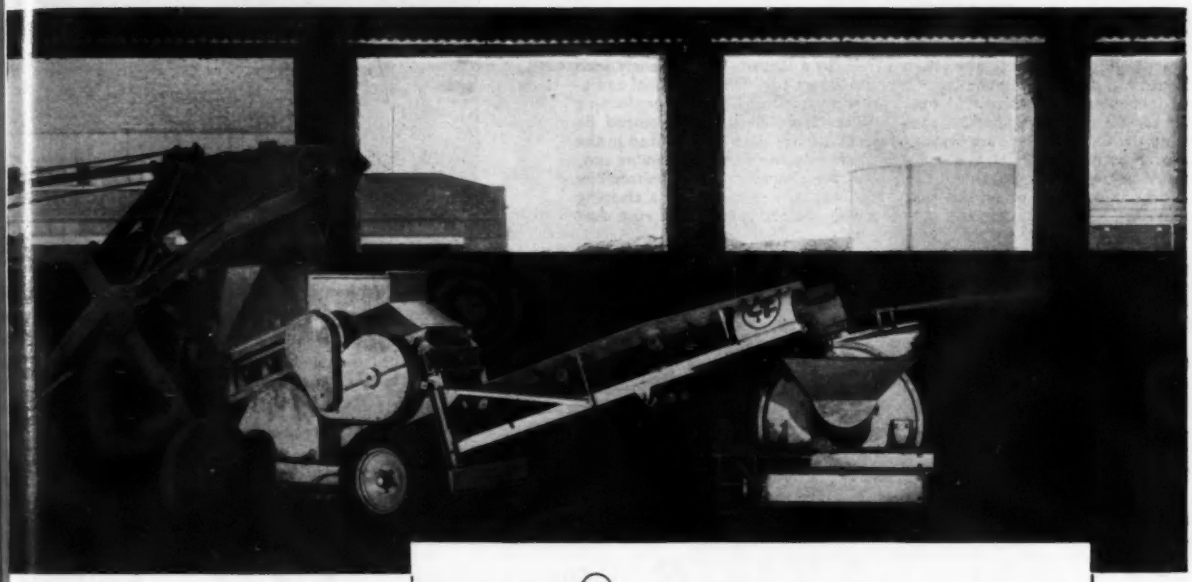
CRONE & TAYLOR (ENGINEERING) LTD.

SUTTON OAK, ST. HELENS, LANCS. TELEPHONE: ST. HELENS 33

Full particulars of this fast operating equipment will be sent on request.

CT.4267

TWO MEN BREAKING 30 TONS OF OXIDE PER HOUR!



WITH C&T MOBILE EQUIPMENT

FROM 18" CUBE DOWN. The illustration shows C. & T. Mobile Equipment receiving from a mobile shovel oxide in very hard lumps up to 18" cube, and reducing it down to 80% minus $\frac{1}{8}$" size.

This equipment, which has a CAPACITY of 30 TONS PER HOUR, consists of:—

THE C. & T. "BIGRAMPUS" MOBILE CRUSHER/FEEDER which embodies a pre-feed conveyor, a twin-roll crusher that breaks to 6" size and under, and a delivery conveyor.

THE C. & T. 30 TON PER HOUR MOBILE DISINTEGRATOR which disintegrates, aerates and stacks the oxide in one operation.

TWO MEN ONLY are required to achieve this high hourly output, namely the mobile shovel driver and the man who keeps an eye on the two C. & T. machines and hitches them occasionally to the shovel to retract them as the heap of disintegrated oxide grows.

RANGE OF SIZES. C. & T. manufacture Mobile Oxide Breakers with capacities ranging from 2 to 30 tons per hour, and Static Oxide Breakers with capacities of 2 to 80 tons per hour.

Full particulars of this fast operating equipment will be sent on request.

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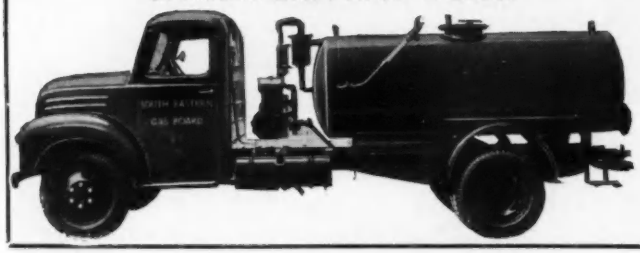
CLEANING BLOCKED SERVICE PIPES METHODS REVOLUTIONISED BY

ALLAN TAYLOR SERVICE PIPE CLEANING OUTFIT

The 75 gallon Allan Taylor pressure/vacuum service cleaning equipment complete with exhauster which can be used for vacuum or pressure. Normally used as a trailer unit and towed by a 10 cwt. van. Clearly seen (central in photograph) are the cyclone and test bar. This additional equipment enables the operator to make pressure tests before and after cleaning the service pipes, the test taps passing 50 cu. ft. or 100 cu. ft. as required. By using the Cyclone the dust drawn from the service pipe is deposited in the sight glass for inspection and can then pass into the easily removable container below. The arrangement further enables the operator at the machine to determine whether or not there has been any success with a cleaning operation. The extractor also prevents the greater part of the rust dust from entering the 75 gallon cylinder.

SYPHON EMPTYING OUTFIT



The Vacuum Syphon Emptying Outfit illustrated is mounte on a 4 ton **Thames** Chassis. A 600 gallon galvanised tank fitted. A rotary type exhauster is driven by a 4 b.h.p. fou stroke air cooled engine, mounted on a sub-frame behind th cab. The tank is fitted with a flame-proof vent and the outl can be used for high or low pressure syphon emptying. large manhole at the rear allows the tank to be cleaned easil A sight glass is fitted to enable the operator to know whe the Syphon is emptied. Twenty-five feet of 1½ in. suction ho is supplied with the outfit. The outfit can be used for vacuum or pressure working.

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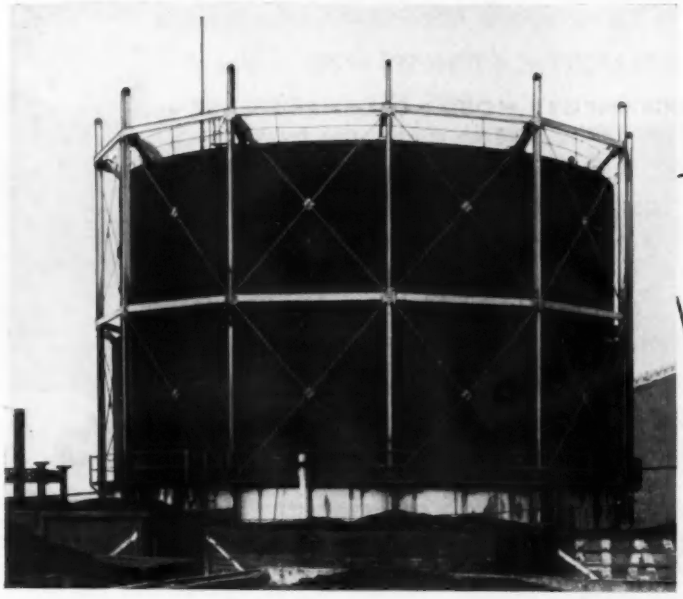
'IMUNOL' in Industry



Gasholder of The North Eastern Divisional Coal Board (Protected with Imunol)

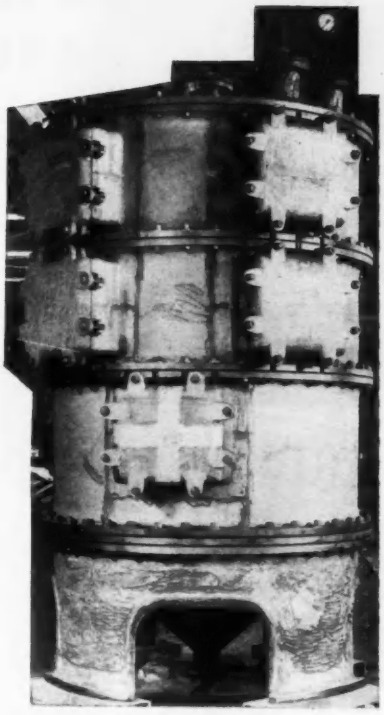
Write for particulars of 'Imunol' the automatic Gas Holder Paint

London Office: 348, UPPER RICHMOND ROAD, PUTNEY, LONDON, S.W.15. Tel: PUTney 3376

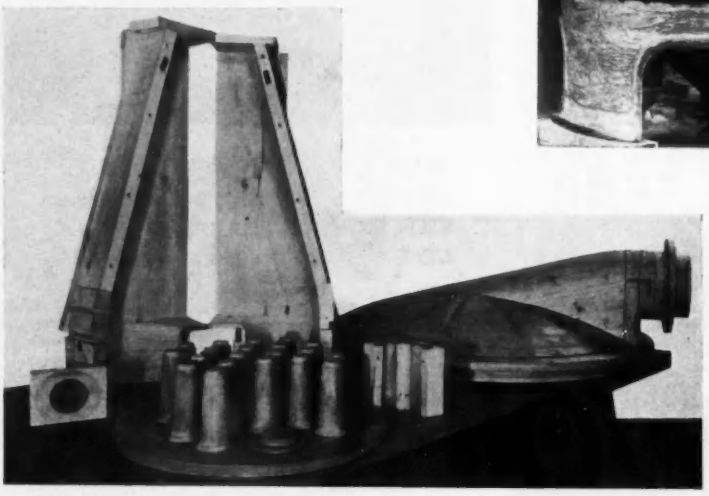
INERTOL CO. LTD., COURTNEY ST. **HULL.**

TELEPHONE: 33701 TELEGRAMS: INERTOLCO, HULL

GASWORKS PLANT



Three of twenty-one Cast Iron Sections with base and top cover for 5'-3" dia. Fractionating column being tested at works prior to despatch.



Wooden patterns and Core Boxes for 5'-9¼" dia. Cast Iron Benzol Still and 2'-3½" dia. Cast Iron CS_2 Still.

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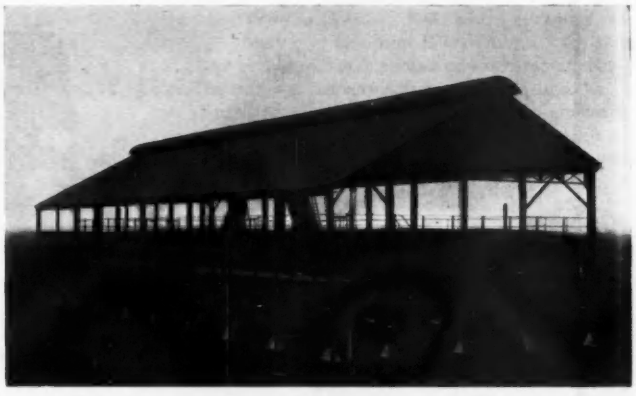

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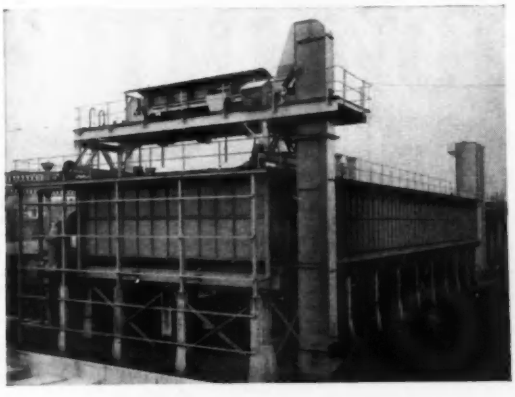

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Well known to your customers is the famous Sofono Fire which burns all night, every night, heats the water and burns economically all types of solid fuel. In 12", 14", 16" and 18" sizes to fit most fireplaces. A trivet and closure are available as extras.

(RIGHT)

The SOFONO LO-FRONT FIRE (RIGHT)

Designed specially for those who prefer a "lower" and less expensive fire. It will burn all night and heat the water for the whole household. A new simplified type of air control is incorporated in this model, and is very easy to operate. A dual purpose trivet which also acts as a closure cover is available as an extra. In 12", 14", 16", and 18" sizes.

The SOFONO DROP FRONT (PATENTED) FIRE (LEFT)

This model gives full room radiation and the patented drop front also serves as a trivet if desired. The fire bars can be lifted out for cleaning and no front brick is necessary. In 14", 16" and 18" sizes. No extras are required for this model.

These fires can be seen at our London Showrooms, 4, Stratford Place, London, W.1.

All models are available in attractive shades of lustrous and vitreous enamels.

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20 to 25 tons of coke de-breezed and bagged per hour

with the SMITH HARMER coke loader

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Illustrated leaflet available on request.

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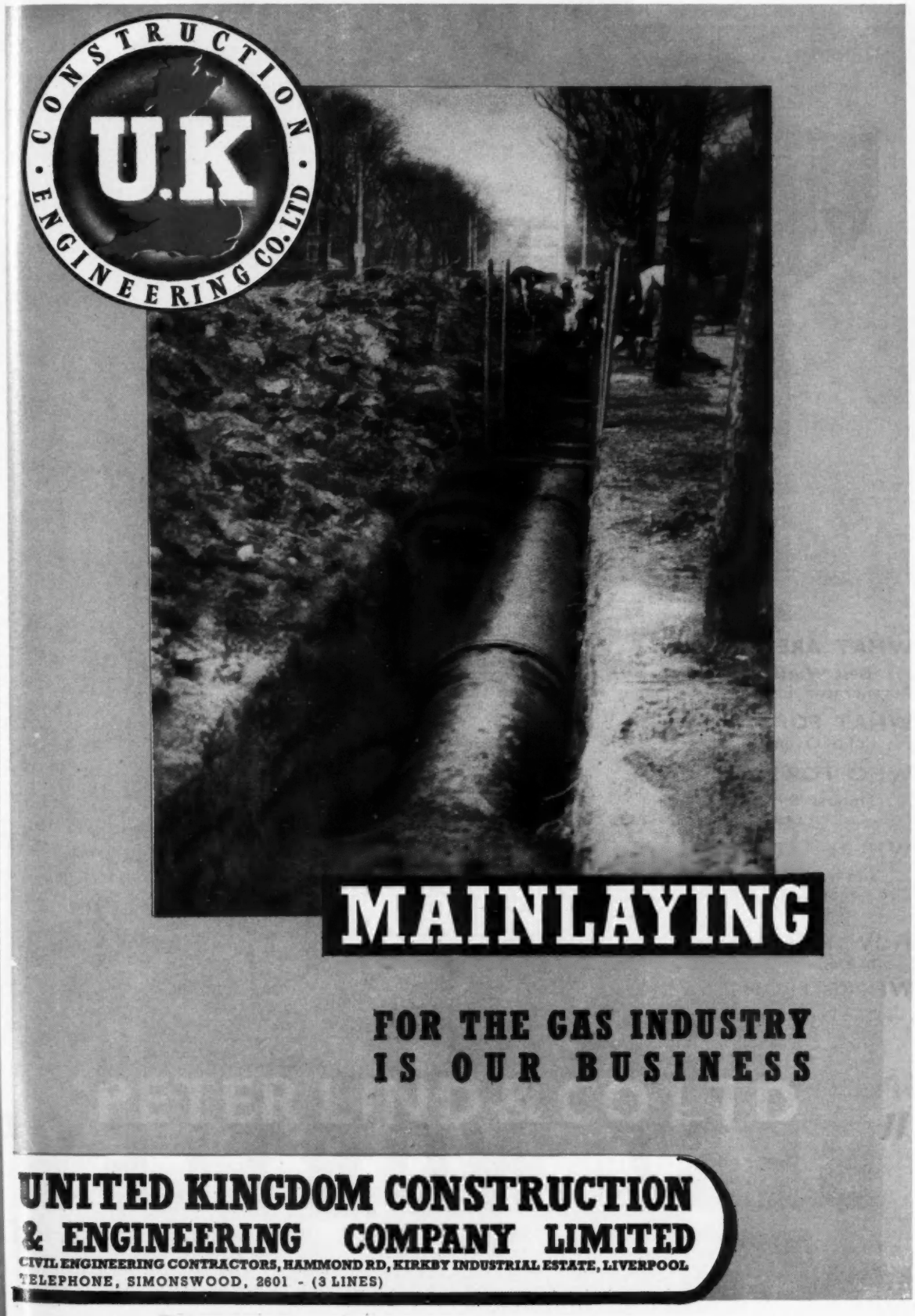
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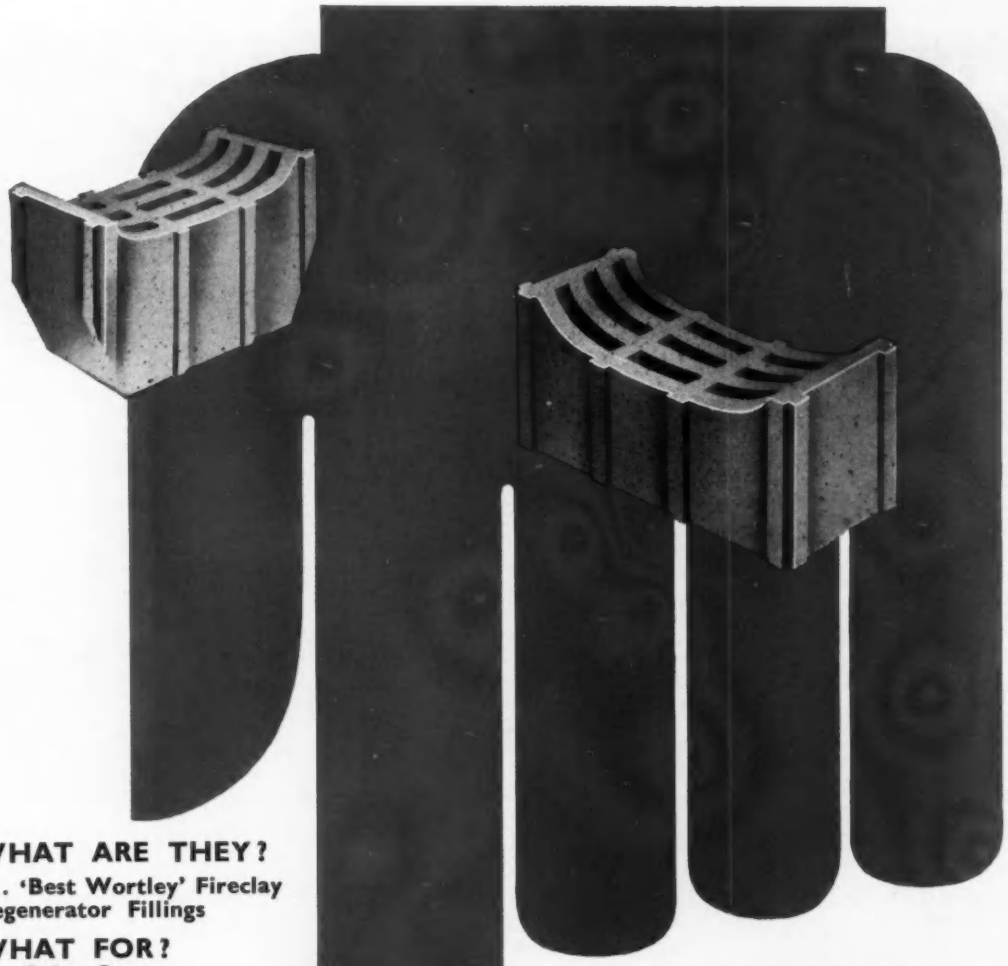

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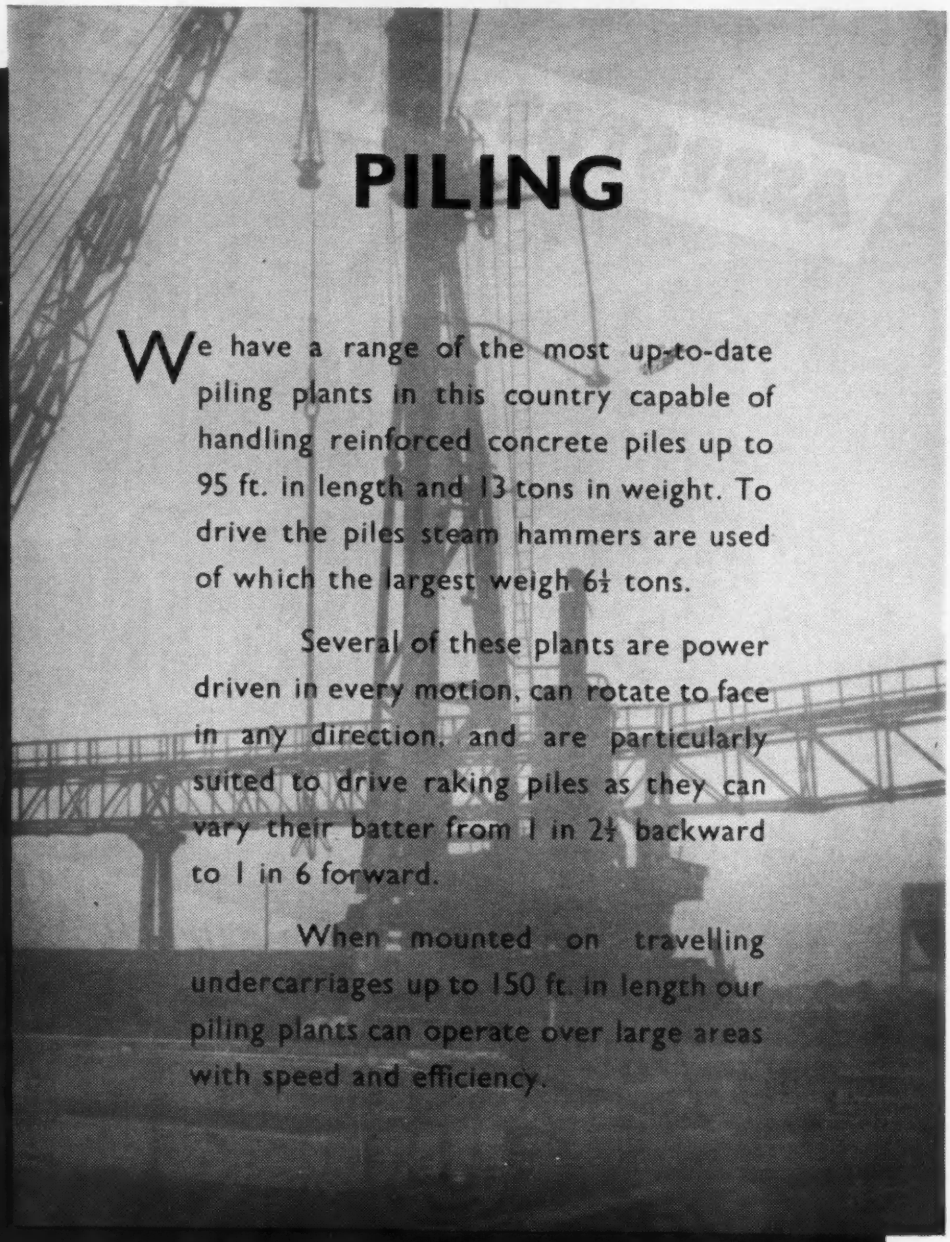

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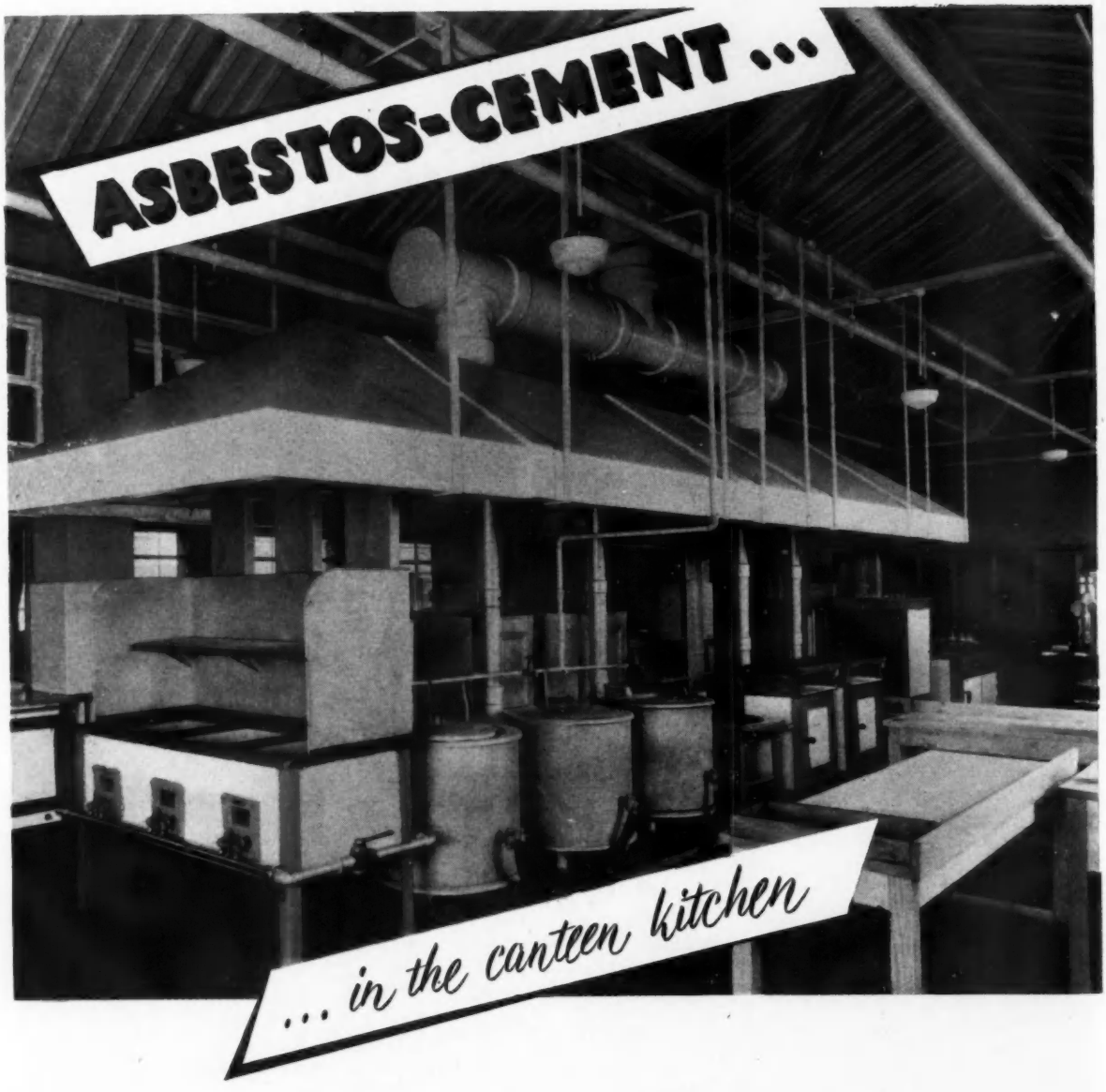

The above photograph illustrates the use of "Everite" Asbestos-Cement Flue Piping (Heavy Quality) and an "Everite" Asbestos-Cement canopy in a modern canteen kitchen.

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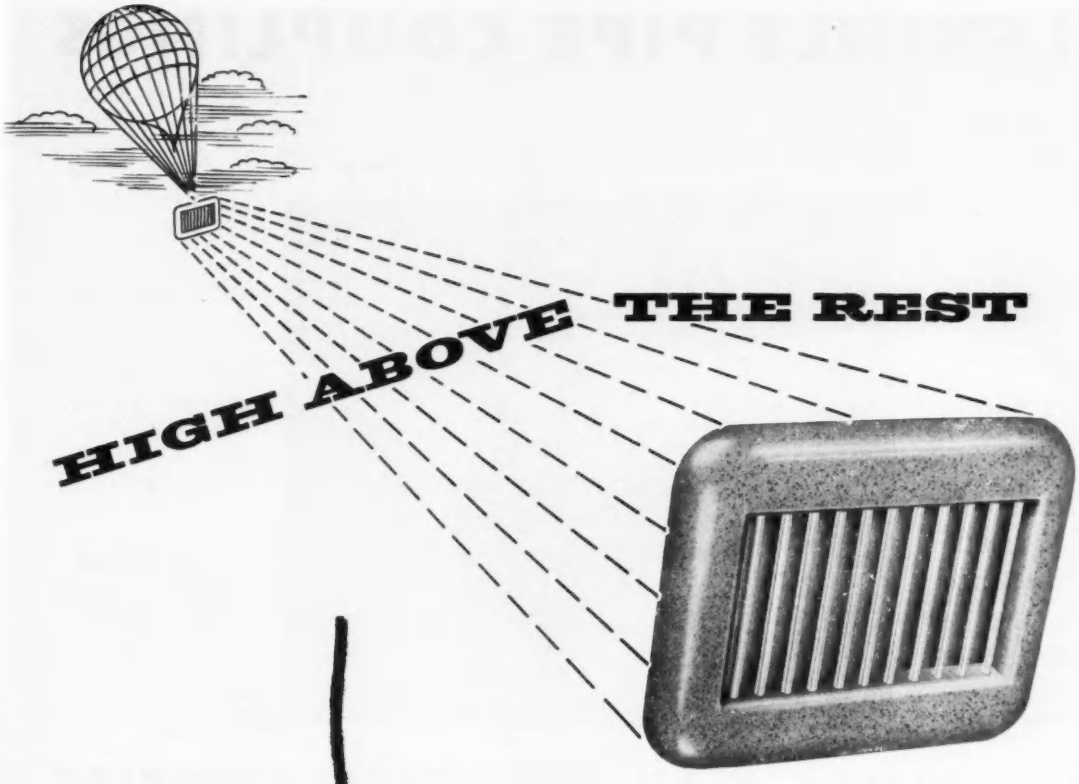

Send for detailed dimension drawings and full particulars of the "Mastertherm"

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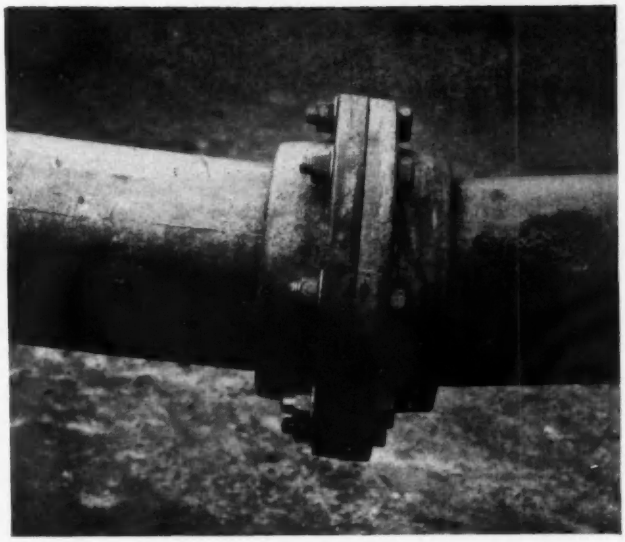

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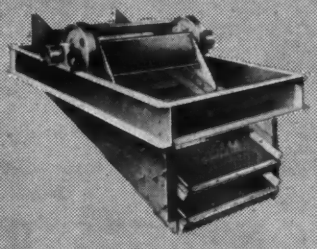

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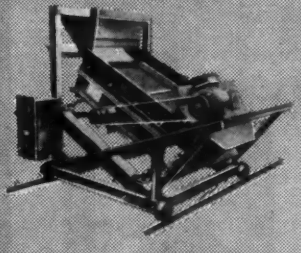

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Undertaking	*No. of Screens*
Brighton	56
Rotherham	20
Exeter	19
Aberdeen	32
Wandsworth	15
Weston-super-Mare	9
Paisley	5
Burton-on-Trent	2
Dunfermline	2
Sedgley	1
Arbroath	1
Dover	13
Walsall	4
Boston	2
Uddington	1

Undertaking	*No. of Screens*
Salford	13
Dumbarton	12
Stockton	11
Coventry	13
St. Albans	9
Denton	13
Perth	4
Carlisle	2
Peterhead	2
Blyth	2
Stirling	1
Leamington	1
Stoke	11
Stratford-upon-Avon	3
Leek	2

Undertaking	*No. of Screens*
Glasgow	20
Mitcham	9
Bath	6
Chelmsford	6
Wrexham	3
Scarborough	3
Prescott	2
Llanelly	3
Armadale	2
Barrow-in-Furness	2
Galashiels	1
Leyland	1
Rotherham	20

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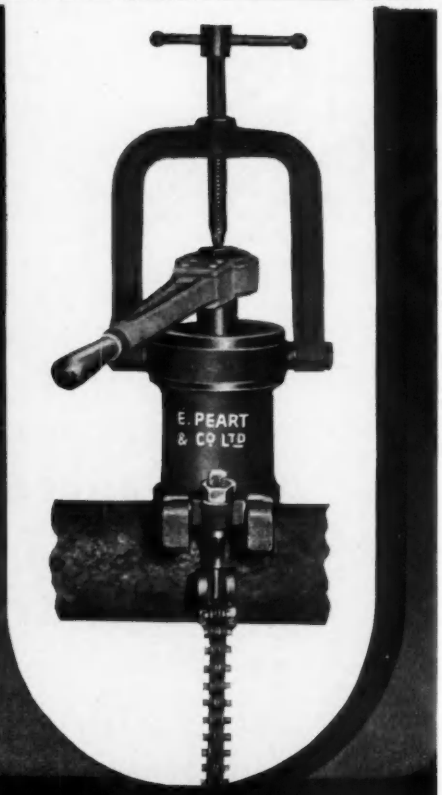

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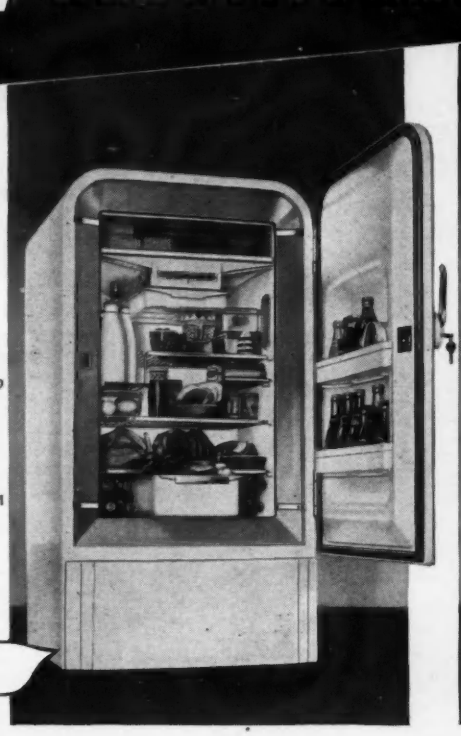
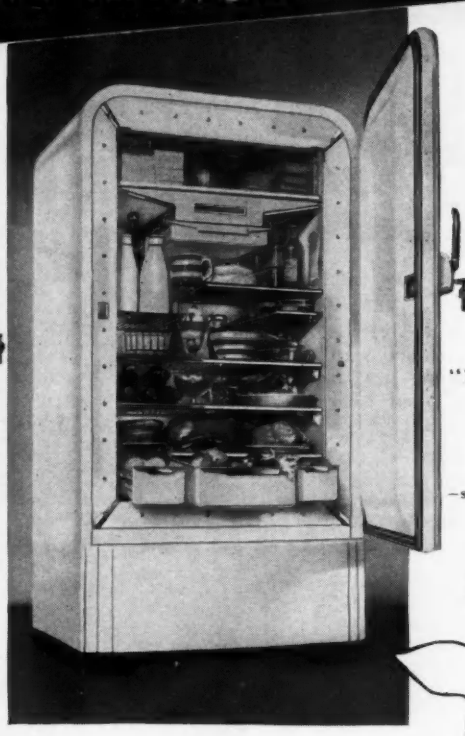


"The New L.500 has two clever door shelves!" —says MR. THERM



"The New L.701 holds 9½ lb. of frozen food!" —says MR. THERM

L.500 £112.5.10 (tax paid). An 'extra' size refrigerator of graceful modern design. Special features include two door shelves, frozen storage and ice-making compartment, interior light and lockable door handle. Internal volume: 5 cu. ft. approx. Shelf area: 9¾ sq. ft.

L.701 £135.0.6 (tax paid). A handsome cabinet for all installations where generous capacity is required. Special features include large frozen storage and ice-making compartment, vitaliser drawer, interior light and lockable door handle. Internal vol.: 7 cu. ft. approx. Shelf area: 13¾ sq. ft.

Also available: **Model L.300,** £77. 16s. 11d. (tax paid) internal volume 3 cu. ft. approx. and shelf area of 5.8 sq. ft. **Model LH.150,** £57. 17s. 4d. (tax paid) table top model with drawer for kitchen utensils and a shelf area of 3½ sq. ft. **Model L.150,** £54. 18s. 10d. (tax paid) free standing cabinet of modern design with a shelf area of 3½ sq. ft.

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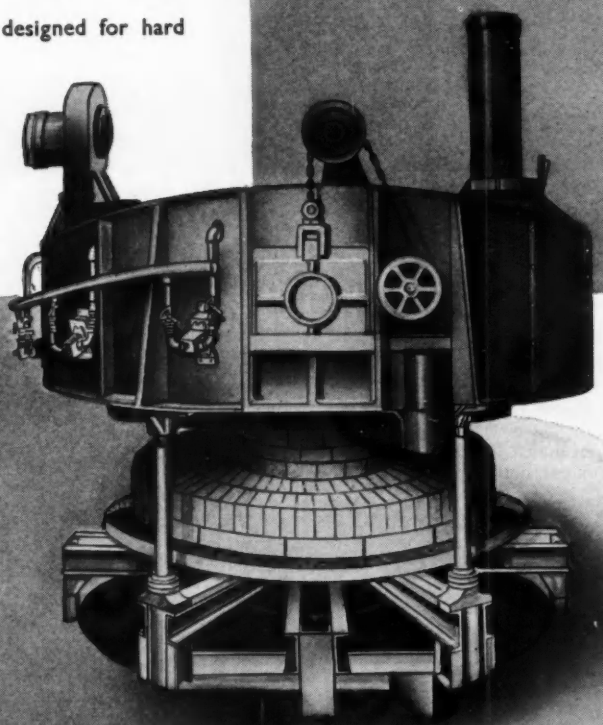
These furnaces are designed for hard usage, critical temperature control, and practically scale free heating.



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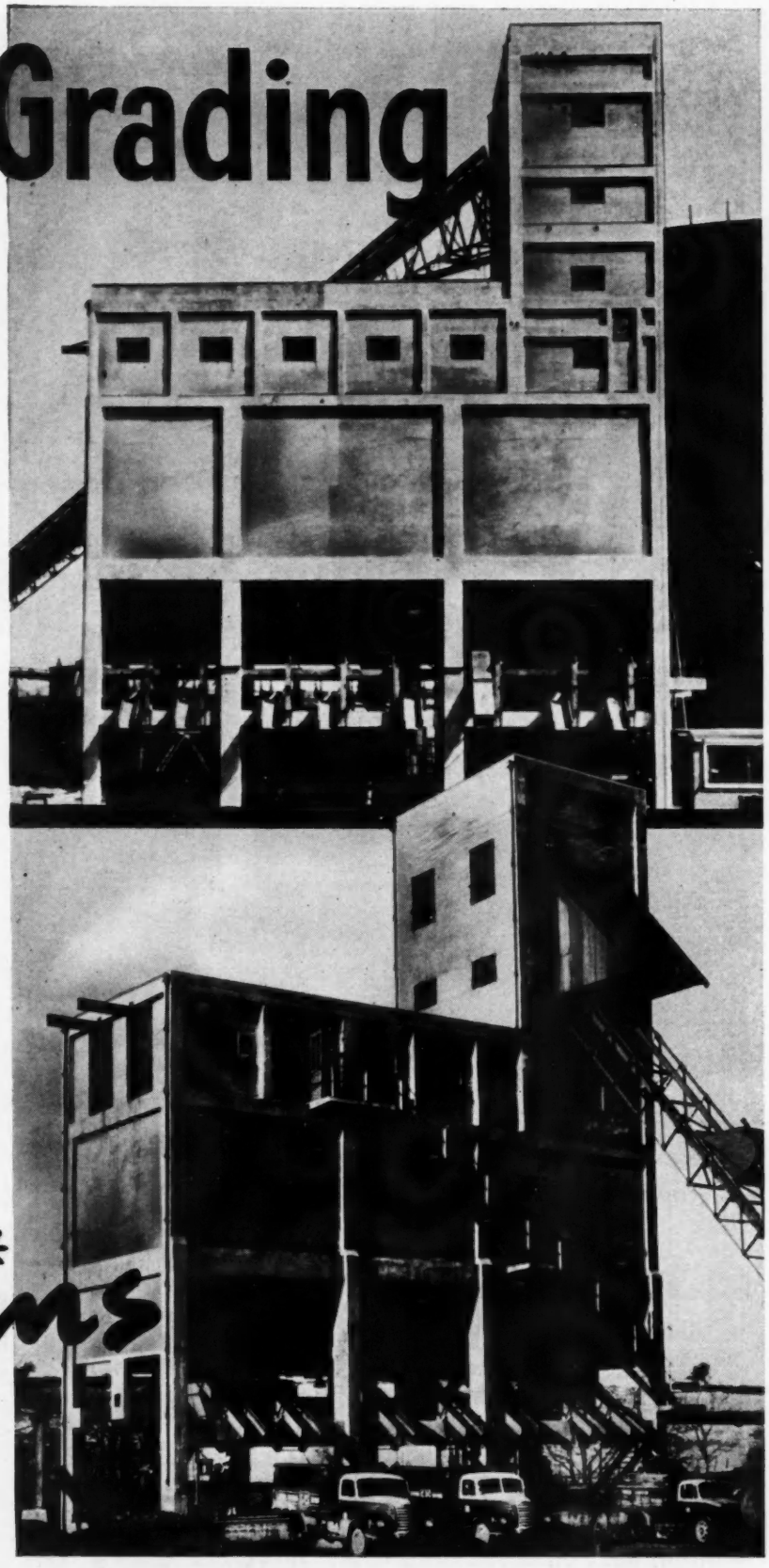
The policy of the Gas Council and Area Boards for the production, preparation and marketing of quality coke has been the consistent aim of our Company since its inception. The two plants illustrated, Barrow (upper) and Harrogate (lower), show our continuing collaboration in this policy.



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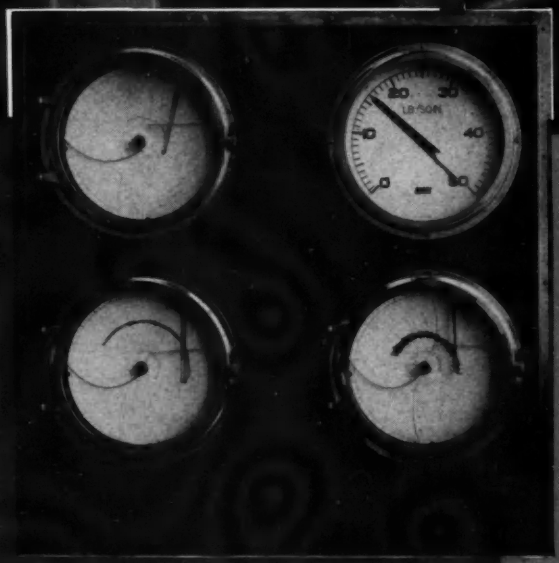

Above (left): Automatic Producer Control. Pressure (and volume) in the common CO main is maintained constant by accurate throttling of the air blast to the producer bank.

Above (right): Hydraulically-operated Retort House Governor. This ultra-sensitive, self-contained governor responds immediately, without hunting, to ensure stable control under the most difficult and varied conditions of pull.

Inset: Typical R.H. Governor Instrument Panel. The records reveal pull conditions and governor action throughout the 24 hours. The indicator dial shows liquor pressure and a recorder measures vacuum in the Waste Gas Flue.

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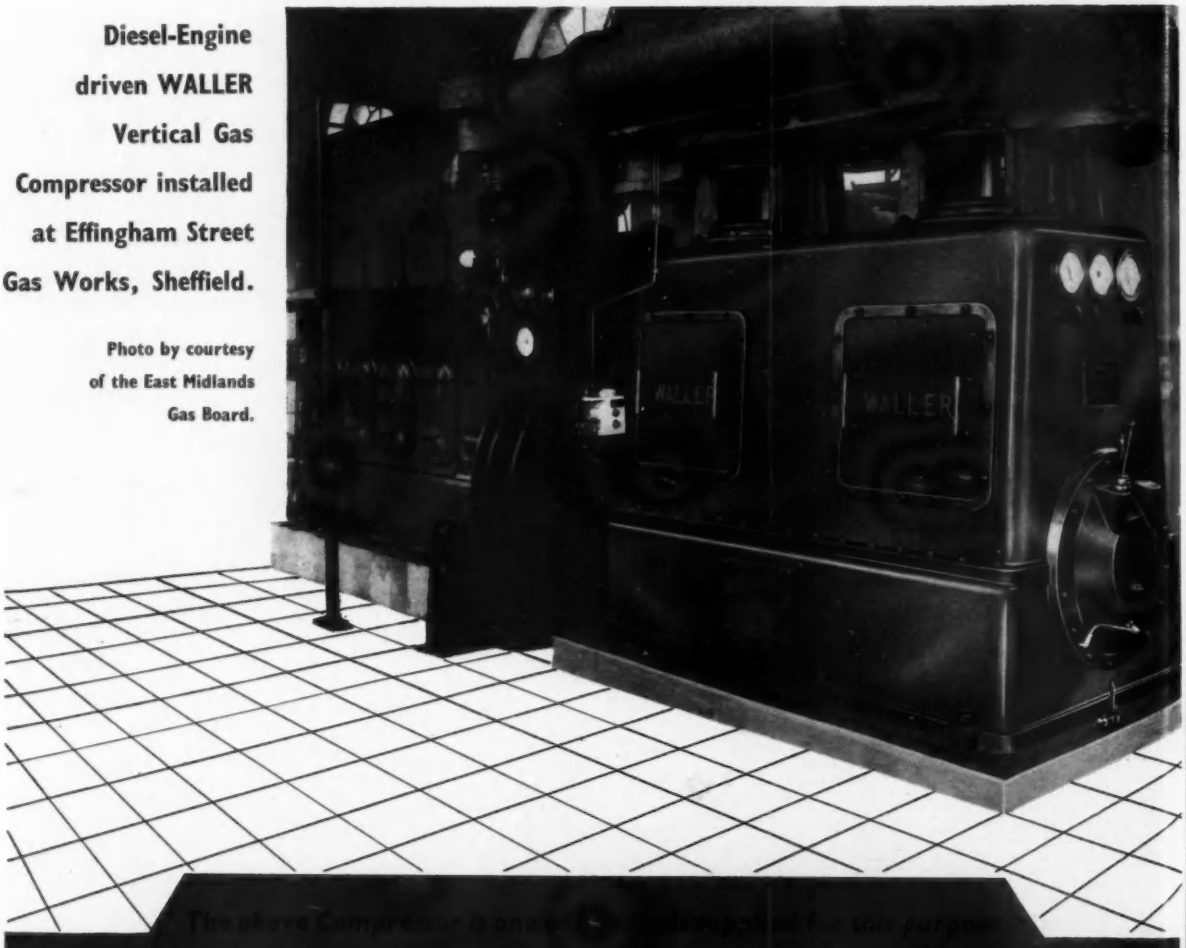
Photo by courtesy of the East Midlands Gas Board.



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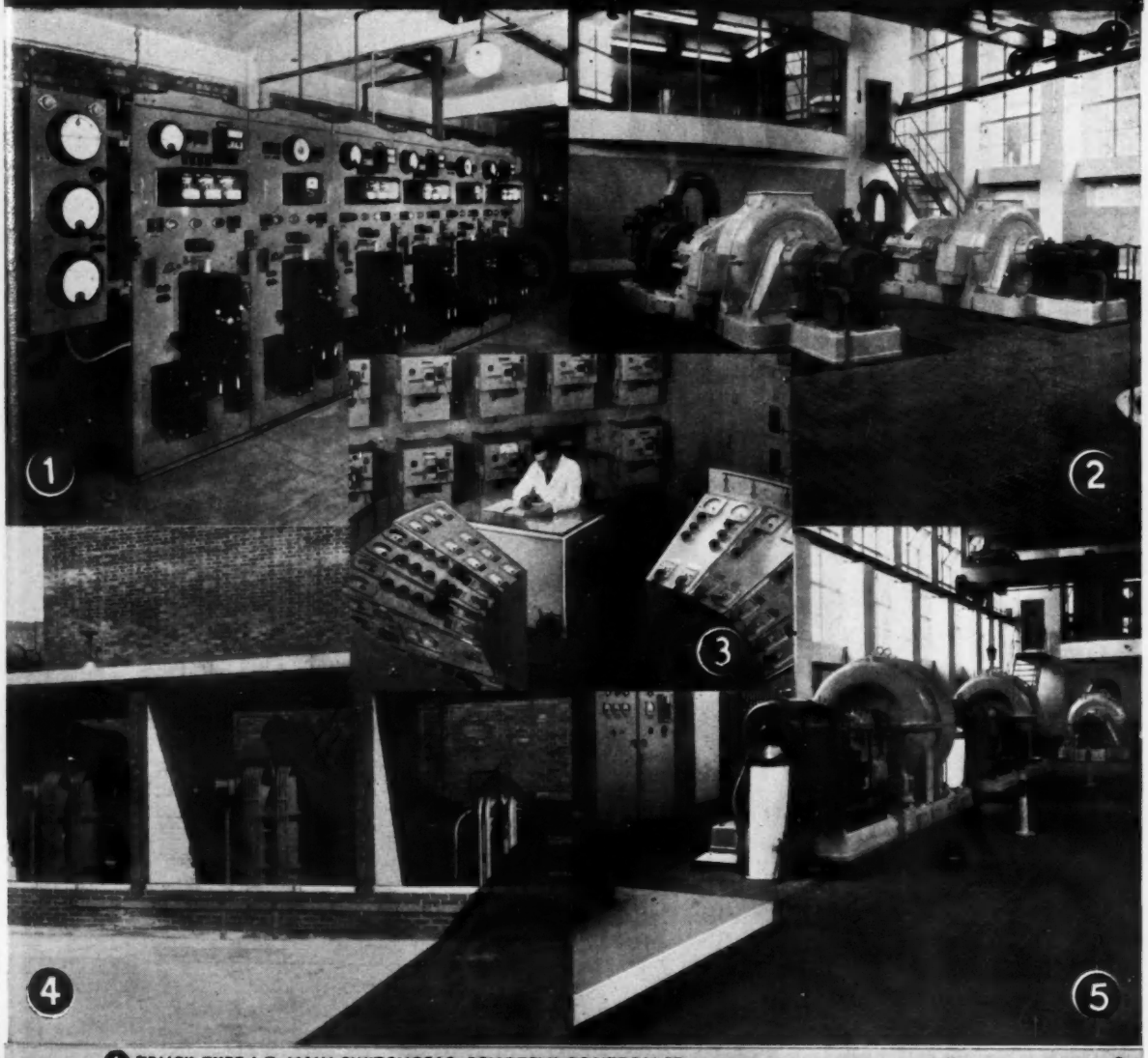

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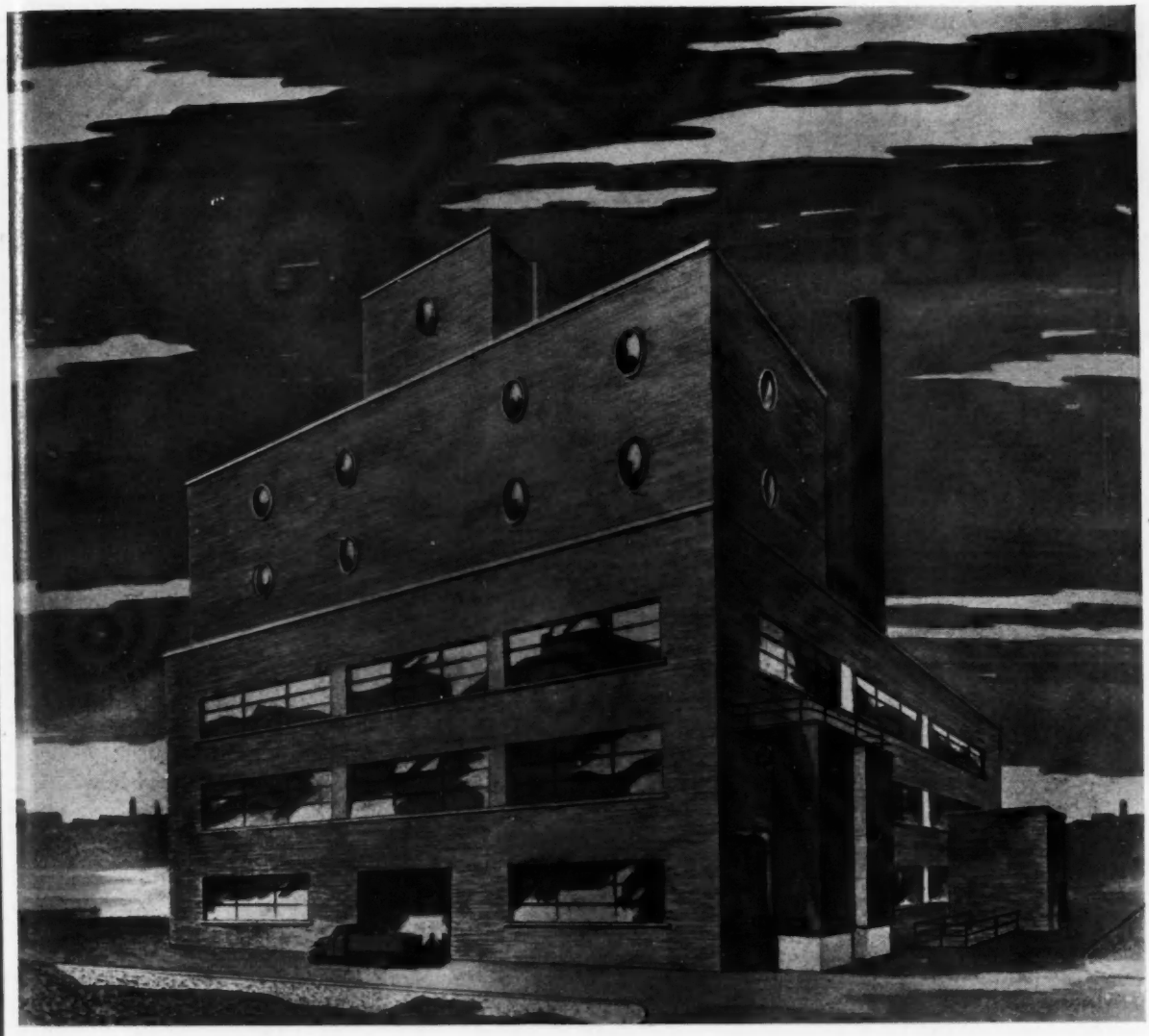

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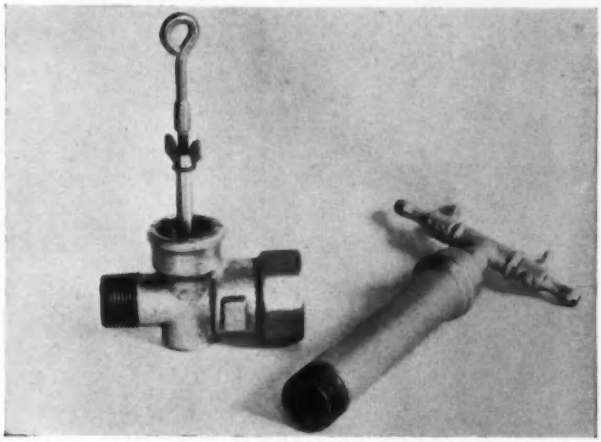

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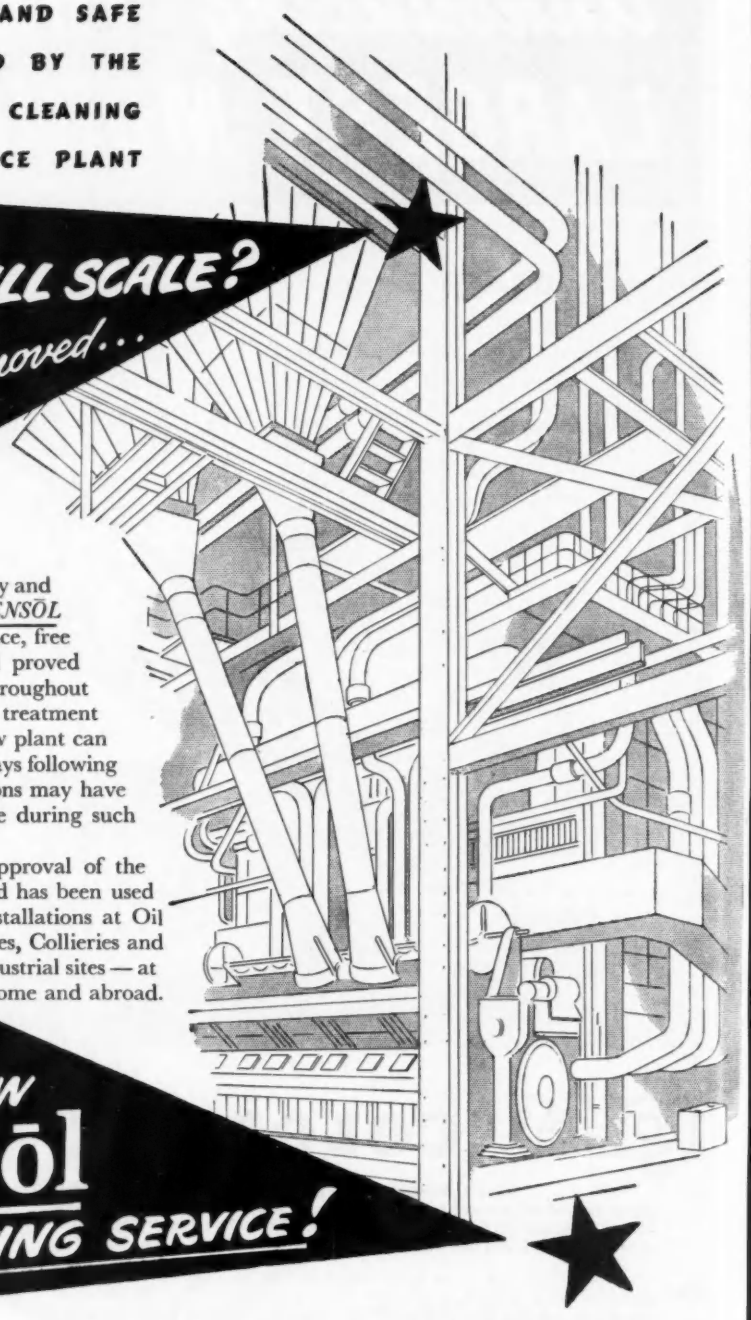

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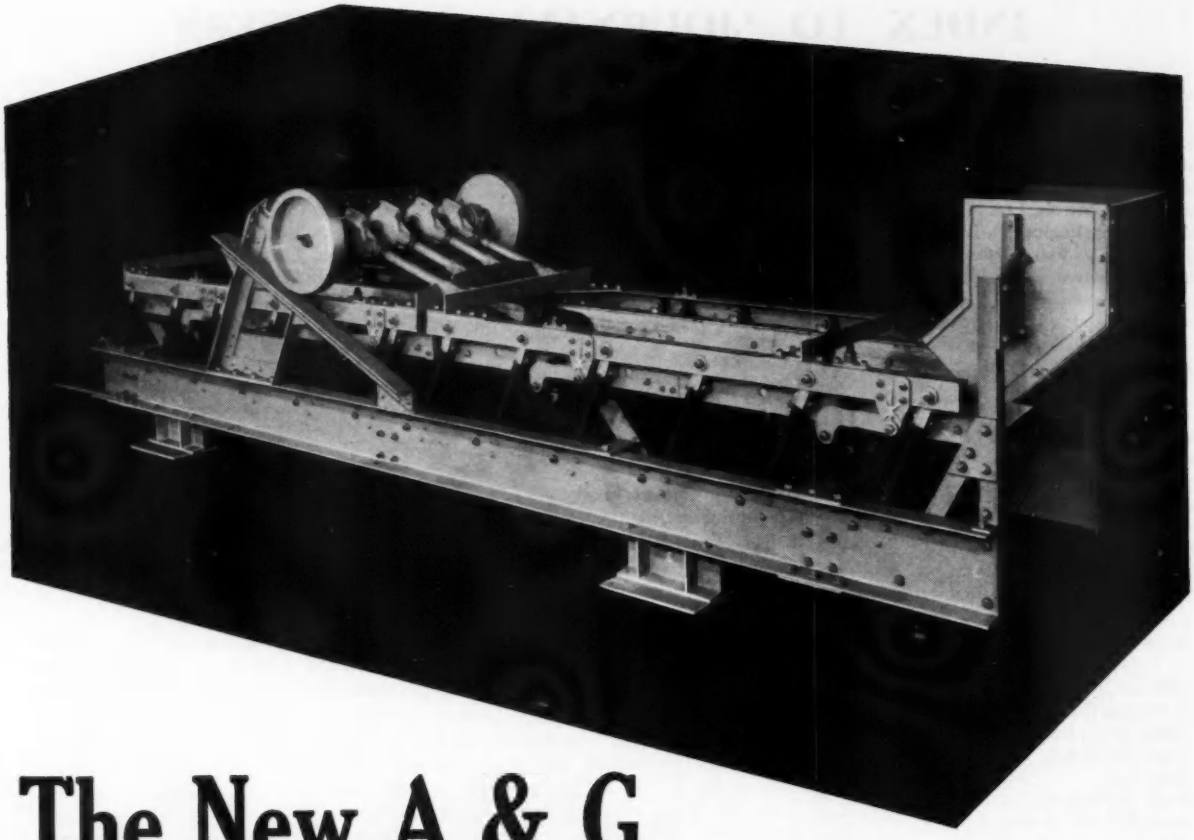

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106th YEAR OF PUBLICATION

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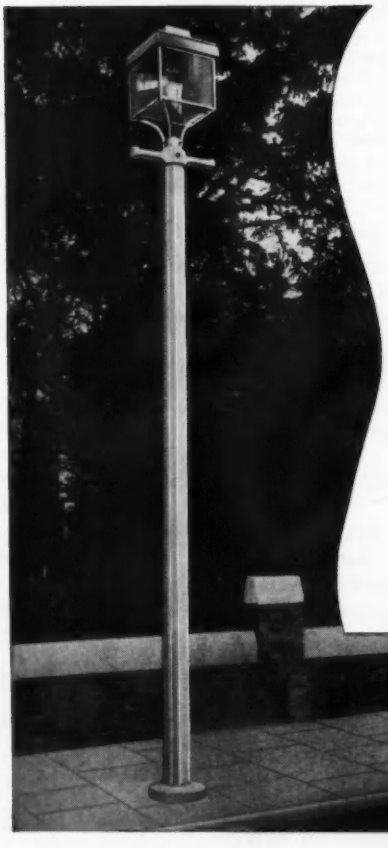

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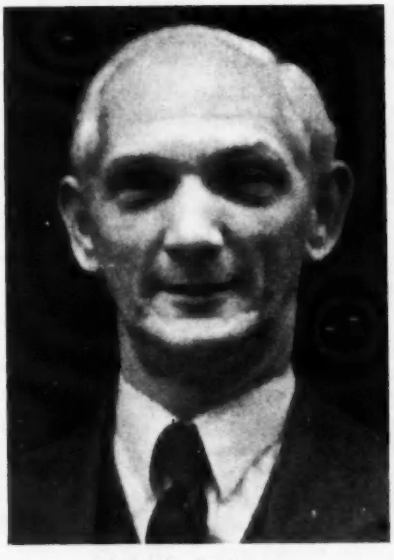
Gas Journal

VOL. 278. No. 4750 106TH YEAR June 16, 1954

THE FIRST FIVE YEARS

The theme for the 91st Annual General Meeting of the Institution of Gas Engineers at Bournemouth was to be a review of what the President called the 'five years of transition since vesting date.' Mr. J. T. Haynes suggests that the gas industry has now settled down under the new regime, that it is permissible to review some of the changes that have taken place, and, in words that are characteristic of his wise, balanced, urbane outlook on life, to consider some of the opportunities which the Gas Act of 1948 presented to us as technologists, to measure the use we have made of those opportunities. From the point of view of the general theme, the papers presented are completely overshadowed by the very fine, very frank and extremely interesting account of the life of the South Western Area by Mr. C. H. Chester, Chairman of the South Western Gas Board. The Institution and the industry are under a great debt to Mr. Chester for this comprehensive and calmly objective account of the growth of the organisation and development in one of the 12 areas into which the industry is divided. We shall return to it later, but it must be mentioned here because it is impossible to comment on the Presidential Address without looking over one's shoulder at life in the South West.



Mr. John T. Haynes, President, Institution of Gas Engineers.

It is not within the province of the Institution, as the President said, to discuss policy making. There is no reason why we of the Press should be so diffident. Indeed, this very question of policy, or absence of it, is one of the issues which must shortly be joined, not only in the gas industry but in the overall structure of the nation's fuel and power resources. But first things first. It was inevitable and to a great extent excusable that the first five years should have been required by the several boards, and by the Gas Council itself, as a transition period in which each board has been hammering out its organisation, each in its own geographical and sociological conditions. It is for the appreciation in detail of this transition in one area that Mr. Chester's generous contribution is to be so highly prized. Policy is taking form in the areas. No really national policy is discernible even in the gas industry. But we do see the emergence of general plans in all areas. And that perhaps is as much as we could expect in the first five years.

Very early in his Address the President remarked on the disappearance of the 'engineer and manager.' There were, he says, some 600 men of this rank who, whatever the size of the undertaking for which they were responsible, met their colleagues at meetings of the Institution and elsewhere on terms of equality. Subject only to ability and personality each man's views and opinions carried equal weight with those of his colleagues. The disappearance of this type, however regrettable, has been balanced by some advantages. His 'very independence often militated against a constructive policy for the industry' as a whole—a policy, as we have said, not yet achieved. But the first five years have seen a levelling up of standards of gas and coke quality and of consumer service, the elimination of black spots which 'provided arguments for those who derided the industry' and made things difficult for those who were striving 'to raise the status of the industry in the minds of the Government and of the public.' There has been a rapid ironing out of silly variations, often between two sides of the same street in an urban district, in price, quality, and conditions of sale.

And we like the President's robust view that many (he might have said most) of those prominent in pro-

gressive thought are now in positions of even greater responsibility and scope and that their influence has been for the good of the industry. He deprecates the attitude of some who, nursing grievances about their loss of status and independence, are more concerned with their rights than with their new, though different, opportunities and who fail to recognise that without the initiative and drive of their more adaptable colleagues the gas industry might decline and they might lose not only their rights put their very livelihood.

At the same time there is one function of the old 'gas manager' which should not be allowed to lapse. It has been mentioned in several recent addresses and again in Mr. Chester's paper. In the South West, and we believe in other areas, the attempt is being made to install a 'district manager' who—'can devote the whole of his efforts to serving the consumer and the development of gas sales.' But the most important aspect of his duties is to become known locally, to represent the board in the eyes of the public and so far as the housewife is concerned to represent the gas industry. 'Mr. Gas Service' should be known and respected as well and as highly as any other local figure.

The most obvious advantage of nationalisation has been the facility provided for reasonable integration. The President touches briefly on the almost insurmountable obstacles which prevented the realisation of, for instance, the recommendations in this direction of the Post-War Planning Committee. 'The Gas Act, 1948, swept away all those difficulties; and whatever may be one's political views, it must be admitted that the Gas Act, 1948, gave to the industry opportunities for which we have been longing since the beginning of the century.' These opportunities have been seized in different ways in different areas. In some cases physical integration has practically coincided with administrative amalgamation. The autonomy of the boards has enabled each to work out the details according to the geo-physical features of the area and to the distribution of population. Mr. Chester has revealed in a most engaging way the processes and reasonings which led him and his Board to the organisation finally adopted after four years' experience. It will be interesting to see whether other boards will eventually modify their original schemes of integration. In some cases, Wales for instance, it would appear that a multiplicity of comparatively small administrative units will persist. In others one would think that integration, administrative as well as physical, might well be extended over the whole of large conurbations still divided. At any rate all will agree that in many of the smaller communities gas supply has attained standards which seemed beyond expectation under the old regime.

The tendency to concentration of manufacture in very large units is unmistakable. It has been shown on paper that gas can be made by conventional methods at a decreasing cost into holder as the capacity of the works rises to a pretty high figure, probably somewhere in the region of 10 mill. cu.ft. a day. But, as the President puts it, there is still some truth in the idea that, beyond a certain figure, the large works is merely a multiplication of the size at which optimum results are obtained. It has, however, been pointed out that optimum results can be maintained even on the largest scale if the several units are wisely manned with competent technicians each with sufficient scope and authority to impress his personality on the plant entrusted to him. It is when we come to some of the newer methods, such as those proposed by Dr. Dent, that economical results are only to be obtained in very large units. The technical feasibility of these methods has already been demonstrated up to the pilot plant stage and it may be that the final proof is only to be obtained by the expenditure of sums of money so considerable as to be beyond the resources of any one area board.

It may be that the resources of the industry as a whole may have to be pooled in the effort to get plant experience ready for the day when it will be a matter of life and death to be in a position to deal with coals of qualities very different from those still available, supplies of which must eventually run out. Five years is obviously too short a time for the development of the very big ideas which are before us. But we cannot avoid the impression that there are several directions in which 'our chemists' have solved problems, in their laboratories, in which 'our engineers' are ready to 'construct and operate plants which can implement the discoveries of the chemists,' but in which our administrators are not yet ready with finance and policy to put these solutions to the proof.

We have already remarked on the disappearance of the 'engineer and manager,' that all-rounder of the gas industry. Another unmistakable trend in the first five years has been the dispersal of his functions among specialists. It was inevitable. But it can lead to a dangerous narrowing of the individual. The Education Scheme of the Institution can supply the corrective. Largely within the period under review the new examination of the Institution has been coming to fruition, and if the results are not yet all that they might be, we can be assured that future Chartered Gas Engineers will begin with a sound foundation in general engineering science. Specialisation in the individual should be deferred as long as possible. And if to the principles of chemistry, physics, and mechanics are added those of finance, or at least costing, so much the better, as long as accountancy remains a tool of management and not its master. This is the more to be borne in mind because coal cost is an even more essential factor in the nation's interest than money cost.

It is difficult to discern any decided trend in the type and nature of gas-making plant. Considerations of cost alone seem to have influenced the choice of coke ovens in some very large installations. Their disadvantages are well known. They are really only suited to base load operation. Considerations of atmospheric pollution almost prohibited their installation in populated areas of an increasingly urbanised and suburbanised countryside. The same defect applies, though not to so high a degree, to intermittent verticals and horizontals. But all lend themselves to coal-blending which some day may be vitally necessary. Whether the new 'carrier-gas' technique applied to continuous verticals will enable these to overcome their disadvantage in this respect remains to be seen. But the superiority of the continuous vertical retort from the amenity point of view remains unchallenged. Another tremendously important factor in the choice of gas-

making plant which has been increasingly recognised is that of the peak load. The position of carburetted water gas plant for this load is challenged by the direct gasification of oil. And the appearance of large quantities of tail gases and residual oils from the growing refinery plants renders it imperative that we should use all these in the gas industry rather than wait until they become serious competitors. The revival of complete gasification by 'conventional methods' following the success in France of 'gaz intégrale' will be noted with interest.

At any rate the gas industry is not losing in interest and opportunity for adventure. It depends for its successful development on a steady recruitment of young men of high calibre. We cannot more fitly close our reflections on the first five years than by quoting again from the Presidential Address. 'Any impression that the work of a gas engineer is lessening in interest and opportunity is wrong, and there must be no room for doubt that gas engineering is very attractive as a permanent career.' It is definitely a man's job.

'PEPIN'S DAY'

On a later page will be found a report of how, 125 years after gas was first produced in Jersey and nearly a century after the present company was founded, the Jersey Gas Light Company celebrated one of the most historic days in its distinguished life. The opening of the new works had, of course, no direct connection with the Institution of Gas Engineers, but the fact that it was neatly 'engineered' to take place at the end of Institution Week was of benefit to both sides, giving the ceremony the added gloss of distinguished visitors who might otherwise have been unable to attend, and providing the conference with a sting to its tail which was as unusual as it was welcome. All who attended the ceremony and the accompanying festivities must agree that it was a memorable day, a day which to us on the nationalised 'mainland' is all too rare, and a day which gave an immediate and impressive insight into not only the wise direction and growth of the Company, but also into the part which the Company plays in the life of the Island. Mr. Duret Aubin, the Deputy Chairman, summed the whole thing up when he referred to it as 'Pepin's Day.'

The truth of this is not hard to understand when one considers that Mr. Stuart Pepin, the Managing Director, not only conceived the new works as his brainchild and nursed it patiently through times of difficulty and shortage, but also was responsible for much valuable and sometimes even dangerous work during the period of German occupation when he performed the unenviable task of controlling fuel supplies on the Island. An amusing reference to these activities was made by Lady Coutanche, wife of the Bailiff of Jersey, who spoke of the days of the occupation when Mr. Pepin had come to the Bailiff's home 'on a mission something to do with cooking the accounts for the benefit of our visitors.'

At all events, the large gathering of Jersey notabilities on June 4 was evidently considered to be a good opportunity for the Island to say 'thank you' to Mr. Pepin, and they did so with charm and sincerity.

Another touch of humour came when Mr. Duret Aubin, proposing the toast of 'The President and Members of the States of Jersey,' explained that it was to the States of Jersey that the Gas Company in its present form owed its life. They had always taken a great interest in it, he continued, preferring control without the troubles, responsibilities and worries of ownership. The statute governing the Company left all the worries to the Company, while providing the necessary controls for the public good. However, the basis on which the controls were established was on the assumption that the Company would not be called upon to pay for their coal more than £1 15s. per ton delivered. 'We find that the National Coal Board are now unwilling, even to uphold the Jersey Constitution, to let us have our coal at this price. But the States, in their wisdom, provided an escape clause for an emergency; and it looks very much as if this emergency will last for a long time. The Constitution is, therefore, in need of repair, and we hope the States, in the fullness of time, will show their readiness to amend it.'

The Constitution may indeed be in need of repair, but not so the works which are no less impressive in detail of operation than in apearance. 'The rebirth and recrudescence of Jersey's gas industry,' to which the Bailiff referred, will indeed make the best use of the nation's coal, in which connection Mr. T. C. Finlayson, Chairman of Woodall-Duckham, produced the following witticism: 'What the Ministry of Fuel suggests today, Jersey planned yesterday.'

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Merger of Gas Chambers and Coke Ovens, Ltd. and West's Gas Improvement Co., Ltd.

We are informed that the business of Gas Chambers & Coke Ovens, Ltd., together with their subsidiary, Chamber Ovens, Ltd., has been merged into that of West's Gas Improvement Co., Ltd. The C.O.L. business will be carried on uninterruptedly as previously at its present address under the title of 'West's Gas Improvement Co., Ltd. (C.O.L. Division).'

Mr. Arthur H. Lymn will be appointed a Director of West's Gas Improvement Co., Ltd., and the personnel will continue as hitherto.

Correspondence relating to C.O.L. contracts under execution and to any existing C.O.L. plants should be addressed to West's Gas Improvement Co., Ltd. (C.O.L. Division), Chandos House, Buckingham Gate, London, S.W.1.

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Modernisation will be the keynote of the Laundry, Dry Cleaning, and Allied Trades Exhibition at Olympia from July 8 to 17, in which there will be a Gas Council exhibit. A deterioration in the high standard of service of the laundries is recognised and there is now an all-out drive for efficiency and economy. This involves the re-equipment of this important industry, a process which has led to an unprecedented demand for modern plant and machinery. Members of the laundry and dry cleaning industries will come from the Commonwealth, the U.S.A. and the Continent to find this equipment. The exhibition will be opened by Miss Pat Hornsby Smith, Parliamentary Secretary to the Ministry of Health.

Personal Notes

MR. J. IVAN YATES, a Director of Radiation Ltd., and Chairman of John Wright & Co., Ltd., has been elected President of the Birmingham Chamber of Commerce, his period of office running from May, 1954, to May, 1955.

MR. S. J. YOUNGMAN, who joined the National Benzole Co., Ltd., in 1924 as a clerk, has completed 30 years service with the Company. After working for two years in the Norwich can store, he was appointed depôt foreman at East Dereham. Two years later he was promoted to be a sales representative, and he covers an area extending from King's Lynn to Pakefield.

MR. J. L. GIRLING, a Superintending Examiner in the Patent Office, has been appointed by the President of the Board of Trade as Comptroller-General of Patents, Trade Marks and Designs, in the place of the late SIR JOHN BLAKE. Mr. Girling joined the Patent Office in 1921 and has worked there throughout his career, apart from a period of war service with the R.A.F.

ALDERMAN W. M. YOUNG, Manager, Lampeter undertaking, Cardiganshire, Wales Gas Board, has been installed as Mayor of that town. Alderman Young, a native of Youghal, Co. Cork, left his native Ireland for Wales in 1921 to take up a post at Whitland gasworks. From 1937 to 1941, he was under manager of Pontardawe gasworks and went to Cardigan before taking up his appointment at Lampeter.

SIR HUGH BEAVER, M.I.C.E., M.I.CHEM.E., has been appointed by the Lord President of the Council to be Chairman of the Advisory Council for Scientific and Industrial Research in succession to Professor SIR IAN HEILBRON, D.S.O., who retires on September 30, on completion of his term of office. Sir Hugh Beaver, who has been a member of the Advisory Council since 1952, is Managing Director of Arthur Guinness, Son & Company, Ltd., and Chairman of the Committee on Air Pollution.

BIRTHDAY HONOURS

The Queen's Birthday Honours announced last Thursday included a Knighthood for Alderman PERCY A. SANDERS, C.B.E., J.P., D.L., Deputy Chairman of Davey, Paxman & Co., Ltd., of Colchester, in recognition of political and public services in Essex.

DR. W. IDRIS JONES, Director-General of Research, National Coal Board, was created C.B.E. Other recipients of the C.B.E. were MR. VINCENT PASK, Chief Engineer, Headquarters of the British Electricity Authority, and MR. LOUIS G. VEDY, O.B.E., Assistant Secretary, Ministry of Fuel and Power.

MR. ALEXANDER W. LEE, who recently retired from the post of Deputy Chairman of the West Midlands Gas Board, received the honour of O.B.E. Others who received similar distinction were MR. FRANK C. LANT, Deputy Chief Fuel Engineer, Ministry of Power; MR. JAMES C. MITCHELL, Divisional Controller, North Eastern Division, British Electricity Authority; and MR. WILFRED H. SANSOM, M.C., Production Director, East Midlands Division, National Coal Board.

MR. REGINALD N. LEFEVRE, Training and Education Officer, North Thames Gas Board, and MR. RONALD A. WESTON, General Manager, Norwich Division, Eastern Gas Board, each received the honour of M.B.E.

Recipients of the British Empire Medal (Civil Division) included the following members of the gas industry:

G. P. CLARK, Distribution Foreman, Brighouse, North Eastern Gas Board.

F. H. FRYER, Distribution Superintendent, Darlington, Northern Gas Board.

T. GALLACHER, Yard Foreman, Uddingston, Scottish Gas Board.

T. LYON, Mains Foreman, Rotherham, East Midlands Gas Board.

H. A. RIDGE, District Superintendent, Longton (Stoke-on-Trent), West Midlands Gas Board.

J. E. SIMMONDS, Exhauster Driver, Stratford, North Thames Gas Board.

C. H. WALKER, Joiner, Chesterfield, East Midlands Gas Board.

H. WALLETT, Mains Inspector, Bilston, West Midlands Gas Board.

Obituary

COLONEL CYRIL M. CROFT

By the death of COLONEL CYRIL MURTON CROFT, of Heath Rise, Putney, which occurred suddenly on June 8 after a short illness, the gas industry has lost one of its outstanding personalities of the past half century. Colonel Croft, who was 66, was D.L., J.P., M.I.C.E., M.I.MECH.E., M.I.NST.GAS E. He was President of the Institution of Gas Engineers in 1946, and in the same year he had the distinction of being elected President of the International Gas Union. He was Managing Director of the Wandsworth and District Gas Company until its absorption by the South Eastern Gas Board on vesting date, and he retired a few months after nationalisation.

Colonel Croft served his pupilage under Mr. H. E. Jones and Mr. F. H. Jones, past and last Chairmen of the Wandsworth and District Gas Company, starting his 40 years' active association with the gas industry in 1908. After a short term of service with the Commercial Gas Company as Assistant District Engineer, he was appointed to the position of Works Manager of the Wandsworth and Putney Gas Company. On the formation of the Wandsworth, Wimbledon, and Epsom District Gas Company he was made Assistant Engineer to the amalgamated Company. Eight years later he became Chief Engineer, and was appointed 10 years afterwards to the post of Chief Engineer and General Manager. In 1943 he was elected to a seat on the Board, and in 1946 he became Joint Managing Director.

He became a Member of the Institution of Gas Engineers in 1920, joined the Council in 1940, and was Vice-President in 1944 and 1945 and President in 1946. At the 75th annual general meeting of the Netherlands Gas Association which he attended as President of the International Gas Union in 1948 he was accorded the rare distinction of election to Honorary Life Membership of the Association.

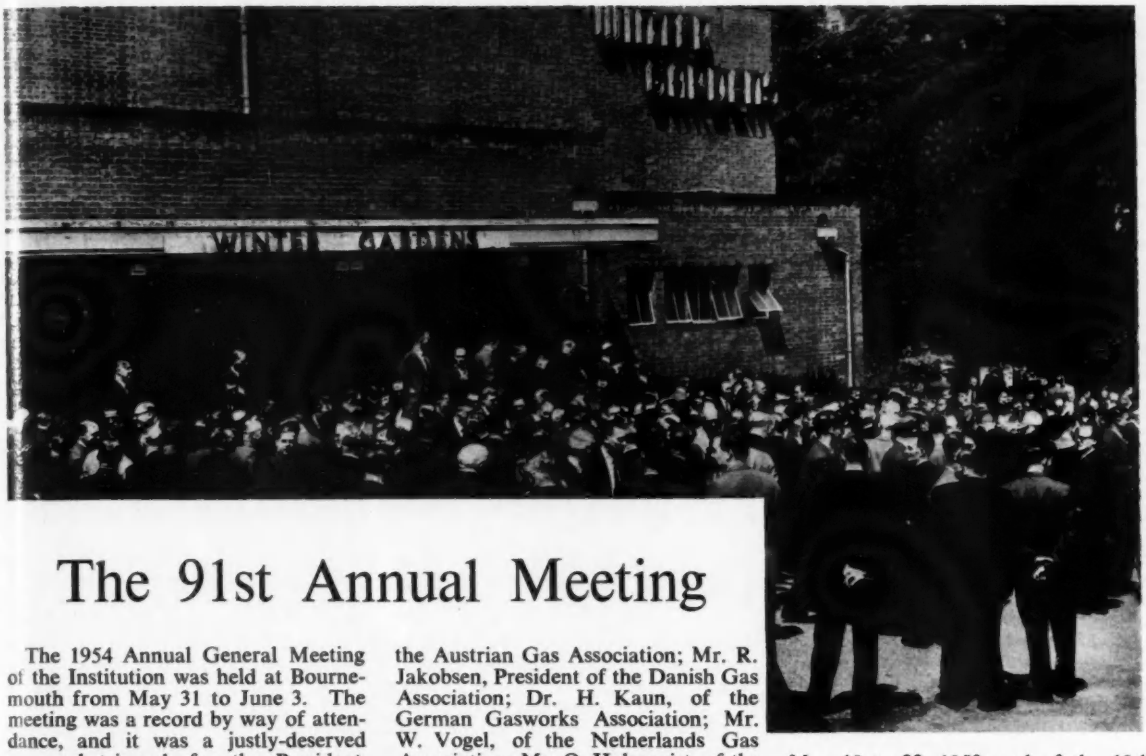
Colonel Croft introduced to Wandsworth an innovation to British gasworks practice, the C.O.L. chamber oven which, at the time he described it in an article in the 'GAS JOURNAL' in 1929 was producing 3 mill. cu.ft. of gas per day, and the tower system of dry gas purification, which he described in a paper to the Institution of Gas Engineers in 1939. The tower purifiers were the first to be erected in England. He was J.P. for the Wandsworth Division of Surrey and Deputy Lieutenant of the County of London.

He was a pioneer in the design of up-river vessels, each successively larger in size, capable of carrying cargoes of coal from the north east coast direct to the Wandsworth works. He was a General Income Tax Commissioner for the West Brixton Division; Chairman of the Gas Consultative Panel for the Allied Control Commission for Germany; Hon. Treasurer of the World Power Conference; Vice-Patron of the R.A.S.C. Regiment Association; Hon. Colonel of the R.A.S.C.; Conservator of Putney and Wimbledon Commons; a Member of the British Railways Arbitration Tribunal; and was, prior to nationalisation, a Director of the Watford and St. Albans Gas Company, the Wholesale Coke Company, Woking District Gas Company and the Greater South London Gas Corporation. He always took a keen interested in the welfare of the young men in the gas industry, and on one occasion, at a meeting of the London Juniors, all the normal rules of debate were suspended in order that Colonel Croft, then Vice-President of the Institution, should have a heart to heart talk with the members on the general subject of the future for the gas engineer.

On his retirement, in July, 1949, a large gathering representing every station and every department of the Wandsworth undertaking assembled to see him presented with an antique clock and a camera, subscribed for by the employees, with accompanying tributes to his technical achievements and his ability to win the confidence and affection of those who worked under him.

MR. WILLIAM DOWIE, J.P., who has died at Markinch, Fife, had a long period of association with the gas industry in that county as Secretary of Markinch Gas Company. He was also Managing Director of the Balgonie Colliery, Ltd., Markinch, Fife, an adjacent enterprise, until nationalisation.

COLONEL ALAN STEIN, O.B.E., M.C., Chairman and Managing Director of John G. Stein & Co., Ltd., died on June 1. He was 65 years of age and was associated with the Company for over 50 years, succeeding his father as Chairman and Managing Director in 1927.



The 91st Annual Meeting

The 1954 Annual General Meeting of the Institution was held at Bournemouth from May 31 to June 3. The meeting was a record by way of attendance, and it was a justly-deserved personal triumph for the President, Mr. John T. Haynes, who showed no signs of flagging in will or deed over what proved to be a very heavy but exceptionally interesting series of sessions.

At the outset of the meeting, which was held in the Winter Gardens and refreshed our pleasant memories of the 1950 meeting held at the same place but under kinder climatic conditions, the MAYOR OF BOURNEMOUTH (Councillor G. Smith, B.SC.), extended a civic welcome. It was, he said, a double pleasure for him to be present—first to meet the President in his official capacity, because they both lived there among beautiful amenities; and, secondly, and just as important, to offer a welcome to the lovely town of Bournemouth.

He asked his audience to 'unbend,' to enjoy the conference; take part in the discussions; and enhance their knowledge of the industry they served.

The SECRETARY (Dr. W. T. K. BRAUNHOLTZ, O.B.E.) then read the notice convening the meeting, following which the PRESIDENT welcomed the overseas members and visitors. This, he remarked, he regarded as a great privilege. During his year of office he had the good fortune to visit a number of the sister organisations who, with the Institution, were members of the International Gas Union; and he was proud to be able to welcome a number of representatives from overseas countries who were members of the Union. He would name particularly the President of the French Gas Association, M. M. Ferlet, the Secretary, M. A. Lihrmann, and M. A. Renauldon; Mr. R. Frey, of the Austrian Gas Association; Mr. R. Jakobsen, President of the Danish Gas Association; Dr. H. Kaun, of the German Gasworks Association; Mr. W. Vogel, of the Netherlands Gas Association; Mr. O. Holmqvist, of the Swedish Gasworks Association; Colonel A. Teutsch, the President, and Dr. H. Deringer, of the Swiss Association of Gas and Water Engineers. And they also had with them Dr. A. Böhm, of the Italian Gas Association, and Mr. N. V. Steenstrup, one of the members from Denmark.

He also wanted to welcome one of their own members from overseas, Mr. W. S. Stredwick, who was a former member of his staff in Bournemouth.

Greetings from Overseas

Dr. BRAUNHOLTZ intimated that they had received a greeting from Mr. H. Carl Wolf, Managing Director of the American Gas Association, who wrote: 'The Officers and Directors of the American Gas Association extend to the officers and members of the Institution of Gas Engineers their best wishes and sincere regards on the occasion of the 91st Annual General Meeting. We wish for you a very successful meeting and know that the interests of the gas industry will be furthered by it.'

In addition he had received a personal greeting from an Honorary Member of Switzerland who was the former Secretary of the Swiss Gas Association and of the International Gas Union—Colonel H. Zollikofer. And a telegram had arrived for the President, not from overseas, but from the Divisional staff of the Southern Gas Board: 'The Divisional staff send hearty congratulations on a very successful year and every good wish for the finest conference ever.'

The Minutes of the 90th annual general meeting held in London on May 19 to 22, 1953, and of the 19th autumn research meeting held in London on November 24 and 25, 1953, were taken as read and confirmed.

Report of the Council

Mr. HAYNES moved, and Mr. H. Johnston, O.B.E., North Eastern Gas Board, seconded the adoption of the 91st annual report, which he commented, was a further record of progress and achievement.

Election of Officers

The SECRETARY announced that the Scrutineers of the Ballots for the election of Officers, Auditors, and Ordinary Members of Council had reported as follows:—

President, 1954-55.—William Kenneth Tate, M.A., General Manager, Eastern Division, Southern Gas Board.

Vice-President, 1954-56.—Henry Frank Harding Jones, M.B.E., M.A., Deputy Chairman, Gas Council.

Auditors, 1954-55.—Colonel Sir Harold C. Smith, K.B.E., D.L., Chairman, Gas Council; and Peter D. Davey, F.C.A., Wood, Drew, and Co.

Honorary Secretary, 1954-55.—John Terrace.

Ordinary Members of Council, 1954-57.—George Edwin Anderson, Newcastle Division, Northern Gas Board; Charles Ronald Murton Croft, B.A., General Manager, Sussex Division, South-Eastern Gas Board; Roland Hall Griffith, B.A., D.PHIL., Director, London Research Station, Gas Council; and Duncan Dewer Melvin, Scottish Gas Board.

Mr. TATE said he wanted all to know that he valued very greatly the confidence which they were reposing

in him. He was a little overawed by the ability and distinction of those who had occupied the Presidential Chair before him; but, granted their sympathy and support, he would do everything he could to justify this confidence.

Mr. JONES also expressed thanks for the honour of his election. He would, he said, do all in his power to support the President and to maintain the dignity of the Institution.

The SECRETARY reported the names of the District Members of Council nominated by the District Sections of the Institution and affiliated District Gas Associations, for the year 1954-55 as follows:—

W. A. Evetts, M.C. (Watford), Eastern Section.

R. M. Farror (Wandsworth), London and Southern Section.

J. Ford (Inverness), Scottish Association.

W. R. Garrett (Newcastle), North of England Section.

C. R. Ingham (Bristol), South Western Section.

H. Johnston, O.B.E. (Leeds), Manchester and District Section.

P. J. Sheehan (Cork), Irish Association.

K. E. Tiddy (Carmarthen), Wales and Monmouthshire.

L. G. Townsend (Liverpool), British Junior Gas Associations' Joint Council.

C. C. Wood (Leicester), Midland Section.

The PRESIDENT announced the appointment of the following four Scrutineers for the ensuing year: G. E. Anderson, C. R. M. Croft, Dr. R. H. Griffith, and Mr. L. G. Townsend.

Presentation of Medals

The PRESIDENT: 'I think you are aware that the Birmingham Medal of the Institution of Gas Engineers is awarded at periods of not less than two years. It is awarded and bestowed for originality in connection with the various possible uses of gas, and the award is interpreted in its widest sense.

President and Secretary in the mood of the meeting.

The Council considered this matter some few months ago, and as we considered the various names one very quickly stood out as pre-eminently the man to whom this medal should be awarded—Mr. F. M. Birks. That was the unanimous choice of the Council, and I take it that it has the unanimous support of all the members of the Institution.

'Mr. Birks—I shall not mention his age, because he is younger than his years—started life as an engineer in the strict sense of the word. He was as a relatively young man seconded to superintend the construction of the Harbour in Brazil; he then came back to Swansea, and after a very successful period of service there he joined the gas industry, entering into the service of the Gas Light and Coke Company in 1921. He brought with him what I call the "question mark" mentality. Throughout he was more concerned with whether or not it was possible to do that which we were already accustomed to do in the gas industry by better methods, or even whether it was worth doing at all. There have been occasions when Mr. Birks has shocked some of his colleagues by his suggestions and his querying of a particular method; but there is no doubt that he has shown originality, drive, and initiative which have marked him as a leader and which have carried him over all difficulties and obstacles.'

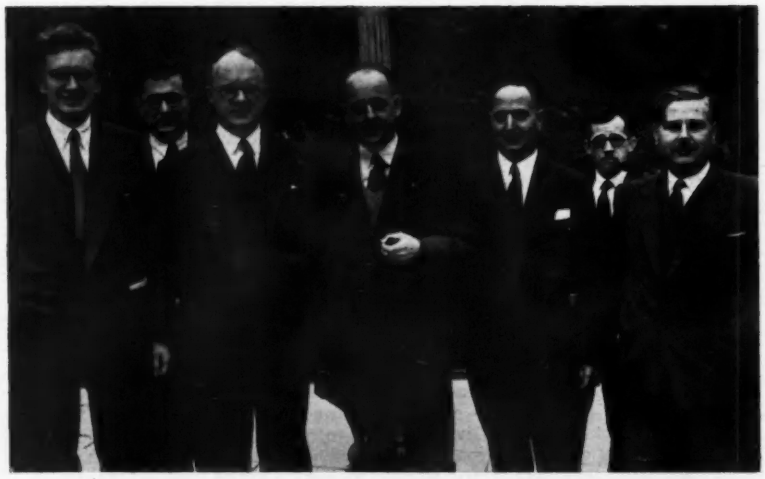
Mr. F. M. BIRKS, C.B.E. (Deputy Chairman, North Thames Gas Board) said how conscious he was of the honour bestowed on him, and he would like to express his gratitude for the many kindnesses which he had received during the time he had been in the gas industry. The award would, of course, be to him a most treasured possession.

Bronze, Silver and Gold Medals won by Mr. Hawthorn

The PRESIDENT: 'As you are aware, the Institution Gold Medal is generally awarded annually for the best paper presented to the Institution during the preceding 12 months. Your Council and the Committee appointed by the Council to consider the matter had no hesitation in awarding this medal to Mr. S. K. Hawthorn. Those of you who had the pleasure and privilege of inspecting the New Swan Village gasworks a few months ago will appreciate that this paper is not only an example of a man's views and ability, but is a foretaste of work that he has actually completed; and his workmanship can be inspected and criticised in a way that very few technical papers can be examined. After we had arrived at the decision we made a discovery. In the annals of the Institution this is the first occasion on which one man has won the Bronze Medal, the Silver Medal, and the Gold Medal. In 1930 Mr. Hawthorn won the Bronze Medal with a paper on "Oxide Purification"; in 1950 he won the Silver Medal for a paper entitled "Making the Best Use of Existing Gas-making plant." Now he has won the Gold Medal for his paper on "Some Special Features of the New Swan Village Gasworks."'

The PRESIDENT went on to explain that the H. E. Jones London Medal was awarded for a paper presented to the Institution dealing with the principles involved in connection with the gas industry. Those of them who attended the autumn research meeting in November last could have no hesitation in supporting the Committee which looked into the matter that the medal should be awarded to Sir Charles Ellis. His paper at that meeting illuminated bedrock principles affecting the gas industry. The paper was entitled 'Some Aspects of Coal Pyrolysis'—not paralysis, from which some of them might think the coal industry suffered.

The PRESIDENT then presented the Institution Silver Medal to Mr. T. W. Jackson—a product of the Bournemouth Gas and Water Company and for some years after the war a mem-



L. to R.: K. Unsworth and C. A. Young (Warrington), J. Baxendale (Leeds), H. Bromley (Bournemouth), H. A. Caryl (Fylde). At Back: R. Pollard (Robt. Dempster) and L. G. Roberts (Widnes).

of Mr. Haynes' staff—and the Institution Bronze Medal to Mr. I. J. Hartill for a paper presented to the Manchester and District Association of Junior Gas Engineers.

Presidential Address

Mr. HAYNES at this stage delivered his Presidential Address, which was published in full in last week's 'GAS JOURNAL.'

Mr. E. CROWTHER, C.B.E. (Past President, Chairman of the Northern Gas Board), in moving a vote of thanks to the President for his Address, said that many calls were made on the time and energies of the President of the Institution; and the gratitude of the members was due and was expressed to him in a comprehensive resolution at the appropriate time. None the less, it was very fitting that one of the many services which he rendered to the Institution, the preparation and presentation of his Address, should be singled out for special thanks; and he was very happy to be allowed to propose such a vote. No matter how easily a Presidential Address might seem to flow when they heard it, they might be sure that it had been thought out and written only at the expenditure of much mental energy, and the consumption of much midnight oil.

L. to R.: W. T. Hainsworth (Rochdale), K. Snowdon (Bolton), A. S. Brush (Malpas), J. R. Hunt (Bolton), C. H. Bamber (Rochdale).

Not the least of its labours came at the very outset when the theme of the Address had to be selected. This, it seemed to him, might fall into one of three broad categories. It might deal with some particular field of the industry's work on which, by virtue of his special study, information, and experience the President was particularly qualified to speak; or it might focus attention on some major problem or problems confronting the industry, suggesting lines of thought for their fuller exploration. The President had touched on both these themes, but his Address really fell into the third category, and was in effect his confession of faith in the industry which he, like themselves, was proud to serve.

This was the 91st annual meeting of the Institution. In those many years they had had the opportunity thoroughly to learn the art of making a wise selection of their office bearers; and they had made full use of that opportunity, as the choice of Mr. Haynes as President had once again clearly shown. His character emerged immediately at the opening of his Address, where he acknowledged in generous terms the help and friendship which he had earned and enjoyed at the hands of those with whom he had been associated, whether as a senior or a junior. He, in his turn, had freely extended the like help and friendship to others.

The keynote of the Address was expressed in the word 'opportunity.' With robust good sense, Mr. Haynes urged any who suffered from nostalgia to face forward, to forget their former so-called independence—not always an unmixed blessing either to themselves or to their undertakings—and to take their full part in the advance of the industry. At the same time he made it plain that few of the members of the Institution had ever hesitated to align themselves with the changed conditions, and that the loyalty to the industry of which he spoke had not faltered.

Mr. Haynes had not confined himself to precept. His whole record of service, both before and since nationalisation, had been marked by a keen sense of duty and of loyalty abundantly entitling him to speak as he had done. His suggestions as to how the professional and personal equipment of the technicians and future managers of the industry could be improved, and their training made still more effective, were based on no inconsiderable experience, and they deserved, as he had no doubt they would receive, the most careful attention. They were indicative of the President's respect for the individual, and his conviction that the best and happiest service could only be given by men capable of developing their personalities to the fullest extent, and given the opportunity and encouragement to do so. It was for each of them to consider afresh whether he was doing all he could, each within his own sphere of activity, to give and to use the opportunities of which the President had spoken. They owed him their thanks for the Address, which had so clearly displayed the philosophy by which Mr. Haynes lived.

Mr. D. D. MELVIN (Member, Scottish Gas Board), seconding the vote of thanks, remarked that their President had journeyed the length and breadth of the country—and of Europe—in maintaining contact with their technical and kindred associations; and his Address imparted a corresponding length, breadth, and depth of experience and vision. The theme of the Address set the theme of the meeting; and in this overture they found encompassed in brief the main melodies and moods in the work to follow.

L. to R.: J. A. Chilcott (Barry), J. Fallon (Incandescent Heat Co.), W. D. Wilson (Geo. Wilson Meters), D. I. Rowlands (Caerphilly), E. Aspinall (Robt. Dempster).

The Address deftly illustrated and underlined the vital messages which Mr. Haynes obviously had in his mind to convey to them when he drafted the programme of papers for the sessions. As one might expect, Jack Haynes had given his opinions on a number of matters of current importance in his usual forthright manner and had expressed them in simple straightforward terms. Their President had brought into open forum thoughts which had been troubling many, had placed them in proper perspective, and had pointed the many ways of new opportunities. Unafraid himself to admit a mistaken attitude or conclusion and to profit by the lessons of experience, he had endeavoured, successfully, to shape a practical pattern for the future out of the events of the last five years. His dynamic reference to the need for a competitive force from within the industry was a call to them all.

It seemed particularly fitting that the vote of thanks should have been moved by Mr. Crowther. He was the first President to give an Address following nationalisation, when he concluded: 'These speculations point to the need for the widest possible outlook on the part of those who direct the industry so that the various abilities of all those engaged in its service may be employed at the highest efficiency.' These words of prophecy and encouragement had been fulfilled and repeated to-day by Mr. Haynes with renewed confidence from the experience of the past five years.

The headlines of the Address were Education, Opportunity, Achievement. A plea was made for education at all stages, at all levels, and at all ages. Their opportunities had been stressed and their achievements had not been ignored. During his year of office Mr. Haynes had himself followed these headlines as signposts; and by his personal contact with them at their meetings and discussions he had given an example of what could be achieved.

L. to R.: R. W. Nelson, R. G. Warr, S. K. Hawthorn, F. J. Bengough (all of Birmingham), H. E. Dyble (Woodall-Duckham), and J. E. Stanier (Stoke-on-Trent).

What he had accomplished could only have been done by the sacrifice of a great deal of comfort and of leisure hours. He had been ably supported, encouraged throughout, and no doubt comforted on occasion by Mrs. Haynes. And in seconding the vote, he asked them to accord thanks also to Mrs. Haynes.

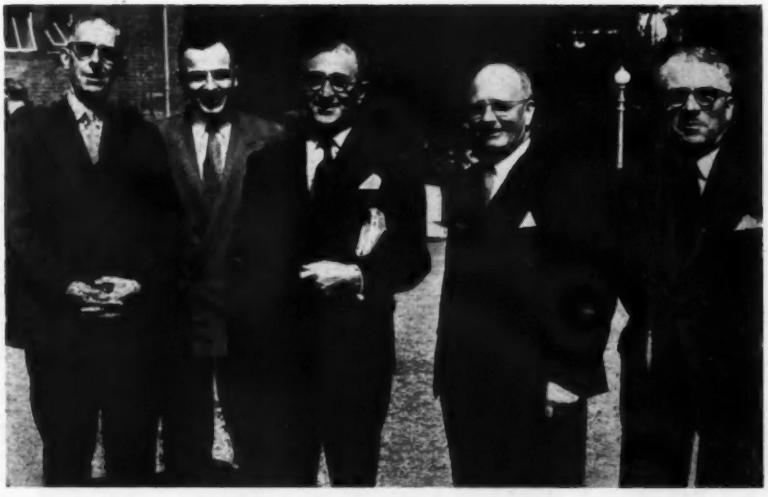
The proceedings at the technical sessions are dealt with in subsequent pages of our issue today.

Vote of Thanks

Mr. W. A. P. HOSKIN (Coke Oven Managers' Association) proposed an omnibus vote of thanks to all those people, listed in the official programme, who had played so great a part in making the meeting a success. He mentioned specially the Secretary and staff of the Institution. It was amazing how, in the course of their multitudinous duties and responsibilities, they had made every visitor feel welcome.

'I should like,' he said, 'to add to the list a charming and gracious lady who, in addition to everything else she has done, captivated everybody who was privileged to attend her tea party in her lovely garden. Many a mere male was indeed envious when compelled to listen to the enthusiastic account given of this delightful visit, and I should like Mrs. Haynes to know of our deep gratitude.'

Mr. H. M. LAWRENCE, seconding, said it would be invidious to point out the component parts of such an obviously smooth running and harmonious vehicle. He would, however, mention one or two outstanding ones such as the civic authorities who had, as it were, gilded the lily of their most beautiful towns; local industries and firms who had thrown open their works for the interest and instruction of their visitors; and the members of the Bournemouth undertaking who had obviously gone to much trouble to give pleasure and to look after the comfort of the members of the Institution.



L. to R.: A. Young, J. A. Drake (Drakes, Ltd.), S. B. Rippon (Newton Chambers), W. A. P. Hoskin (President, Coke Oven Managers' Association), C. E. Byrt (Sheffield).

Presidential Certificate

Mr. W. K. TATE, proposing a vote of thanks to the retiring President, said: 'This annual meeting has been quite outstanding because of the range of topics of the papers which our President has gathered-in this year. It is also memorable because our President has undoubtedly found the secret of eternal youth and has displayed it through the whole of our business and social transactions here and during the past year. The time draws near, Sir, when you will have to pass on the office which you have so enhanced, and in my position I have the very happy privilege of proposing a vote of thanks to you for all that you have done.

'The whole country during your year of office was uplifted by the Coronation of our gracious Queen, and we have all seen the success that has attended her royal progress through lands overseas. You, Sir, as one of your first duties, were able to represent the Institution in the moving service in the Abbey, and I think that

L. to R.: F. R. Corbin, A. C. Treavis, M. J. James, H. A. Cole, H. K. Wilkes (all of the Southern Gas Board).

you have followed the royal example by unprecedented efforts to visit the Institution's relations throughout this country and overseas. There is no question at all that both in your capacity as President and just as Jack Haynes, whom we like so well, you must have done a very great deal to strengthen the bonds of friendship and good fellowship that bind all the members of this Institution together.

'I know, too, that both you and your wife have not only been successful in all that you have undertaken, but you have also been very happy; and we have all benefited by your sincerity and your abounding good fellowship, your unerring social success, and the marvellous way in which throughout your year of office and before you have managed to make us feel at home.

'It is my pleasure to move that the best thanks of this Institution be accorded to you for the conduct of our affairs in the past year, for the dignity with which you have represented the Institution in many other places, for the success that has attended all your meetings, and particularly this meeting in Bournemouth in the last three days, and also—and by no means least—for being Jack Haynes and all that means to those of us who know you very well.'

Mr. ATHOL W. BROWN: 'Mr. Haynes is on the point of retiring from the Presidency of the Institution, but his personality and enthusiasm do not permit any significance being applied to the word "retiring." Amid the complexities of duty he has travelled frequently and far to meetings of District Sections, Affiliated Associations, Junior Associations and Kindred Associations. By his presence and example he has generated a contagious optimism and closer appreciation of the Institution. He has taken the Institution to members in all parts of the country, and his messages have been notable for their vigour and practical worth.

'As a District Member of Council I feel that we owe Mr. Haynes our particular thanks for this facet of his professional activities. Any change in his characteristic cheerfulness and serene calm has not been perceptible during his year, signifying his tremendous capacity for work and the outstanding ability which he has brought to this high office.

'I am very glad to have this privilege of congratulating him on the success of his year, and of thanking him for the happy facilities granted in Bournemouth for our enlightenment and enjoyment. You, Sir, can look back on a happy and memorable year, and share, in the comfort of time, happy memories with Mrs. Haynes who has so nobly and delightfully supported you throughout the year.

The vote of thanks having been carried by prolonged acclamation,

Mr. W. K. TATE said it only remained for him to present the small tangible evidence of a quite outstanding year of office. It was but a simple certificate—simple in form—but it carried with it in the greatest measure their thanks and their hope that for him and Mrs. Haynes it would always be a treasure beyond price and something to which they might look with pride through the rest of their lives. (Prolonged applause.)

Gas Council Support

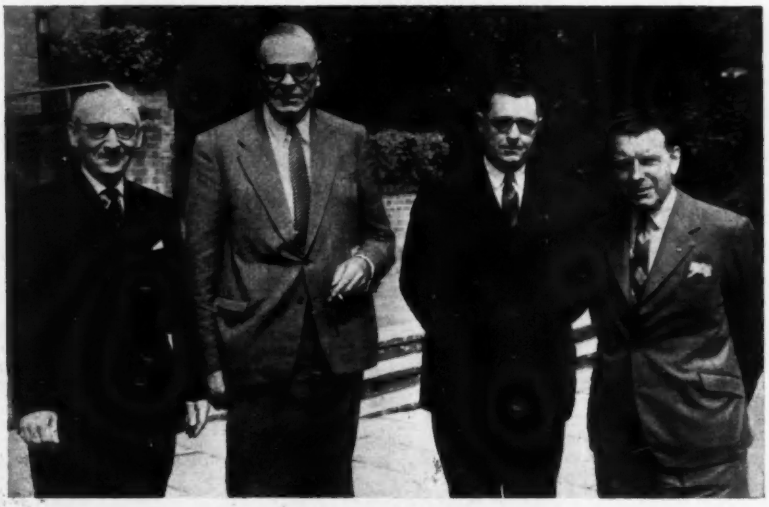
Mr. J. T. HAYNES said that he had made many speeches during the last twelve months, but this was one of the most difficult. He was most grateful for the support which he had had right through this meeting from the Chairman of the Gas Council, Sir Harold Smith. His presence during the meeting indicated a bond between the Institution and the Gas Council which all hoped for and which they now felt was even closer and tighter than before.

Record Attendance?

Another thing on which he wished to comment was the magnificent support shown by the good attendance of so many members at every one of the technical sessions. He felt it might have been a record year in the attendance of members as well as in the level of the discussions. He thanked the members as well as the authors of the papers for having given him so much support.

Reference had been made to Mrs. Haynes. She had accompanied him on nearly all his visits; and if he had been able to meet with her approval, then he was satisfied that he had been a success. (Laughter and applause.)

Lastly he expressed to Mr. Tate sincere wishes that he might have as happy and as successful a year as he had had. He could not wish him anything better.



L. to R.: A. McDonald (N.E.G.B.), R. Gill (Smith Meters), N. C. Sturrock (N.E.G.B.), W. Kirk (Greenock).

THE INSTITUTION BENEVOLENT FUND

The annual general meeting of the contributors to the Benevolent Fund of the Institution of Gas Engineers was held on June 1. Mr. J. T. Haynes presided as Chairman of the Fund, and said that before putting the report of the committee of management and the accounts for the year 1953 for approval, there were one or two points he would like to make.

First of all, members would be interested to know that a 'Beauty chorus' which he provided on the previous day had managed to collect £69 2s. 7d. He hoped that before the Institution meeting closed they would have collected the £75 set as a target.

The next point was that at the instigation of one of the members of the committee, he sent out a letter of appeal to all of those members of the Institution who were not at present contributors to the Benevolent Fund. There were about 51% of their members who were not contributing, a total of some 1,648. With the letter went a prepaid postcard so that all members had to do was to cross out one or other of the lines and put the card into a pillar box. They had received in return 289 postcards; less than 20% of the non-contributing members had taken the trouble to return them. That was a little disappointing, particularly as a number of those who had not returned cards because it was, perhaps, too much trouble, did fill in the very lengthy application form for tickets, and were able to make out and sign cheques to send in so that they could attend the meeting. It would have been nicer if they had taken some trouble to return the postcard. However, with that one note which was a less pleasant one than the others, he was glad to announce that 183 had signified their intention of becoming annual subscribers, which would give a total income of £128 18s. 6d., and donations numbering 56 had brought in over £38. Therefore he thanked and congratulated Mr. T. C. Finlayson, who was the instigator of the letter.

Mr. Sydney Smith (Chairman, East Midlands Gas Board) seconded the adoption of the report, and the motion was carried.

The Chairman announced that the two members whose names appeared on the ballot list had been duly elected. They were Mr. D. Beavis and Mr. J. E. Wakeford.

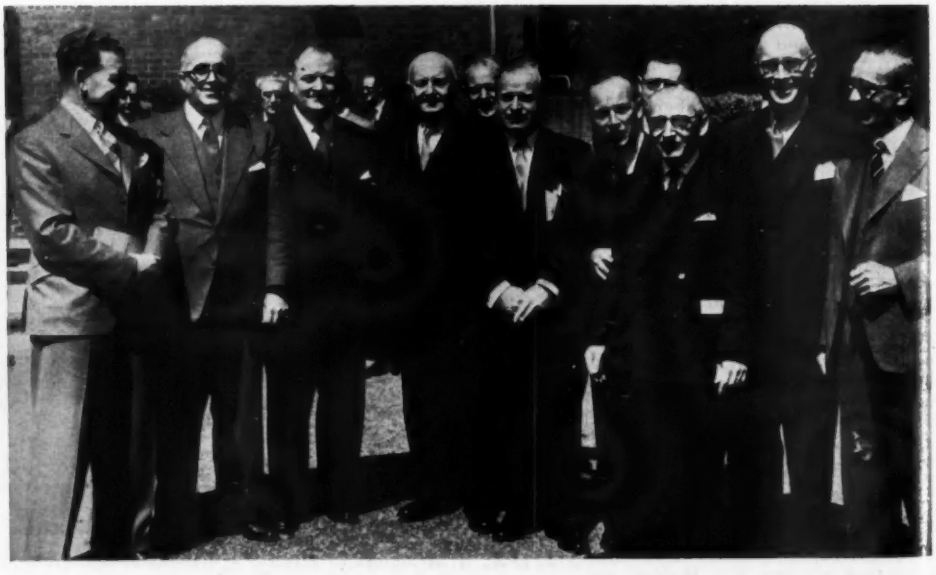
Appointment of a Trustee

The Chairman said the committee of management had received a request from Mr. F. H. Jones to be relieved of his office as Trustee of the Fund. In accordance with Rule 45 of the Fund it was up to the contributors at a general meeting by resolution to appoint a Trustee in place of Mr. Jones. Rule 46 provided that contributors in general meeting might, by resolution, appoint the Institution itself as a Trustee of the Fund either solely or jointly with any other person. In 1949 they exercised their right under that rule on the death of Mr. Henry Woodall, and the contributors appointed the Institution in his place. It was now the recommendation of the committee of management that the Institution be appointed as Trustee in place of Mr. Jones. The remaining Trustee was Colonel Glover. The appointment of the Institution, acting through the Council, had administrative advantages and greatly facilitated dealing with investments and so forth.

Before putting the resolution, he would like members to know that Mr. Frank Jones had served the Fund as Trustee for 16 years, and it was only on grounds of health that he was now tendering his resignation. The Benevolent Fund owed to Mr. Jones a deep debt of gratitude for his continued interest and support over so long a period and in spite of many other calls upon his time. He proposed that they should send to Mr. Jones an expression of sincere thanks and good wishes.

Mr. K. L. Pearce seconded the resolution appointing the Institution as Trustee, and Mr. L. J. Clark proposed a vote of thanks to those who had administered the Benevolent Fund during the past year. The report was evidence of the work which had been done with consideration and sympathy. It was one thing to have a Fund; it was one thing to receive cash for the purpose of the Fund. It was another thing effectively to apply it. It was not an easy job to do. To dispose of the Fund to people in need required great consideration and sympathy. He was sure the officers had that and were entitled to their appreciation. Therefore, he moved a vote of thanks to the Chairman, committee of management, and the Hon. Secretary.

Mr. C. R. M. Croft seconded, and said a tremendous effort was being made to strengthen the Fund, and so far it had met with considerable success, although there had been some little disappointment.



L to R.:
Wm. Kirk.
W. Lawson Hurdman.
C. A. Macleod.
R. J. Rogers.
G. E. Jeffs.
Darrell W. Rees.
L. Fletcher.
A. McDonald.
Sam Hall.
R. Gillespie.

THE INSTITUTION'S HIGHEST HONOUR

MR. F. M. BIRKS RECEIVES THE BIRMINGHAM MEDAL

The Birmingham Medal, the highest decoration the Institution of Gas Engineers can bestow, was presented by the President to Mr. Falconer Moffat Birks, C.B.E., M.I.C.E., M.I.MECH.E., M.INST.GAS E., who was himself President of the Institution in 1951. The Medal was first presented in 1882, and in the 72 years that have since elapsed it has been awarded to only 19 distinguished gas engineers. Its object is 'to encourage the extension of the uses of coal gas' and it is bestowed for 'originality in connection with the manufacture and application of gas, such qualification being interpreted in its widest possible sense'. It is awarded at the discretion of the Council at intervals of not less than two years, and may be awarded to persons of any nation.

Mr. Birks was born in Gloucester in 1885 and was educated at Crypt School, Gloucester. He commenced his engineering career with Fielding and Platt, Engineers, of Gloucester, and spent several years on the design of hydraulic plant in this country and on the erection of plant in the Argentine Republic. In 1908, he was appointed Mechanical Assistant to the Chief Engineer of the Swansea Harbour Trust, leaving that for a while to supervise the construction of harbour works at Para (Brazil) and returning, in 1911, as Chief Assistant Engineer of the Trust.

On the outbreak of the first world war, Mr. Birks joined the Mechanical Transport, and served with distinction in France and Belgium, being mentioned in Dispatches. For his services, he was created an O.B.E. (Military Division).

Returning to Swansea, he resumed his former position with the Harbour Trust until, in 1921, he commenced his association with the gas industry on his appointment as Mechanical Engineer of the Beckton Works of the Gas Light and Coke Company. In 1929, he became Chief Mechanical Engineer; in 1935, Deputy Chief Engineer; in 1941, Chief Engineer; in 1945, Director, and, in 1946, Deputy Governor and a Managing Director of the Company. When the gas industry was nationalised, Mr. Birks was appointed Deputy Chairman of the North Thames Gas Board. For his services to the nation during the second world war he was created a C.B.E.

Mr. Birks has applied his wide engineering experience and abilities to the improvement and development of gas engineering practice in the fullest sense. He has been actively concerned with such varied matters as the design and development of colliers, of cranes and other material-handling equipment, the design of carbonising and purification plant, the design and maintenance of gasholders, gas pumping and distribution plant, the design of consumers' meters and the development of a simple test burner for the adjustment of consumers' appliances. He has done much to reduce the cost and raise the efficiency of power requirements of gasworks. On many of these subjects Mr. Birks has presented papers to the Institution and to other engineering institutions. For his Paper on 'Roller Carriages for Spirally-Guided Gasholders' he was awarded, in 1946, the Institution's H. E. Jones London Medal.

Mr. Birks became a member of the Institution of Gas Engineers in 1925, a member of Council in 1941, and President in 1950-51. Our review of the 1951 meeting of the Institution described his Presidential Address as an unusual and a controversial one. Broadly it was divided into two parts—discussion on the peak load and on tariffs. On tariffs he expressed the opinion that any advantages derived from diversity of load should be evenly distributed throughout the range of all consumers. There is, he said, an average load factor for each activity, which can be ascertained with a fair degree of accuracy if one is not led astray by too close a consideration of abnormal cases which occur seldom and which bear so little relation to the total loads as to be of no real significance.

Turning to the peak load Mr. Birks said that were it not for the increased specific gravity the pressure reductions for several years ahead would have to be much more drastic than had been found necessary in the past. Reduction of output on days of maximum demand due to increased specific gravity could, in the North Thames area, be as much as would be required to provide the gas supply to the City of Liverpool, so it would be appreciated that specific gravity was a powerful weapon. 'I cannot help thinking,' he added, 'that specific gravity is as good a friend to us as his relative, plain ordinary gravity, has been to all engineers for centuries.'

He ably filled the office of Chairman of the Gasworks Safety Rules Committee of the Institution from its inception, in 1937, till 1945. He has been Chairman, since its inception, of the Institution Committe responsible for the arrangement of the Gas Gallery in the Science Museum, South Kensington, and he was himself responsible for devising the illuminated working panels which form the central feature of the display.

Mr. Birks's reputation in the gas industry is international. He is a representative of the Institution of Gas Engineers on the Council of the International Gas Union, and is also a Vice-President of the Union.

The Birmingham Medal has previously been awarded to:—

1882 Sir George T. Livesey.	1918 John West
1884 Frederick Siemens	1923 W. Doig Gibb
1886 Charles Hunt	1925 Charles Carpenter
1890 Thomas Newbigging	1931 Thomas Hardie
1892 William Henry Perkin	1938 Sir David Milne-Watson
1894 William A. Valon	1943 Sir Ernest Smith
1897 Baron von Welsbach	1947 Sir Frederick J. West
1905 James W. Helps	1950 Harold Hartley
1913 Sir Corbet Woodall	1952 E. V. Evans

The New President and Vice-Presidents

W. T. Tate, President of the Institution, 1954-55.

W. K. Hutchison, who becomes Senior Vice-President

H. F. H. Jones, the newly-elected Junior Vice-President.

THE 1953 INSTITUTION MEDALLISTS

REFERENCE has already been made to the award of the Institution's highest decoration—the Birmingham Medal—to Mr. F. M. Birks, C.B.E., President of the Institution in 1951. The presentation of the Medal, as well as of the other Institution Medals, was as usual one of the main items on the agenda at the opening session of the Bournemouth meeting. The Institution Gold Medal was presented to S. K. Hawthorn, Divisional Engineer of the Birmingham and District Division of the West Midlands Gas Board, for his paper on 'Some Special Features of the New Swan Village Gasworks presented at the 90th annual meeting in London last year. The paper, which led to an outstanding discussion, dealt with those special features of design, layout, and operation that represented modern practice, but had, so far, only limited application on gasworks. Swan Village has a daily manufacturing capacity of 8.5 mill. cu.ft. of coal gas and 3 mill. cu.ft. of water gas, with provision for occasional addition of producer gas to meet exceptional peak loads. The H. E. Jones London Medal was awarded to Sir Charles Ellis, F.R.S., Scientific Member of the National Coal Board, for the paper on 'Some Aspects of Coal Pyrolysis,' which he read at the Autumn Research Meeting last November. To T. W. Jackson, Engineer and Manager of the newly-created Weston - super - Mare and Taunton Division of the South Western Gas Board, was presented the Institution Silver Medal for the paper on 'Integration and the Scope for Development' which he read at a meeting of the South Western Section of the Institution in March of last year. For his paper on 'Producer Gas in the Gas Industry,' presented to the Manchester District Junior Association of Gas Engineers in May of last year, I. J. Hartill, of the Technical and Planning Department of the North Western Gas Board, Manchester, received the Institution Bronze Medal.

S. K. Hawthorn.

Sir Charles Ellis.

T. W. Jackson.

I. J. Hartill.

In making the presentation to Mr. Hawthorn, the President said this was the first occasion in the annals of the Institution on which one man had gained the triple crown—the Bronze Medal, the Silver Medal, and now the Gold Medal. Mr. Hawthorn received the Bronze Medal 24 years ago in recognition of a paper on 'Oxide Purification,' and in 1950 he won the Silver Medal for a paper on 'Making the Best Use of Existing Gas-making Plant.'

Before handing the H. E. Jones London Medal to Sir Charles Ellis, Mr. Haynes explained that it was awarded for a paper presented to the Institution dealing with the principles involved in the gas industry. Those who attended the 1953 Research Meeting could have no hesitation in endorsing the award of the Medal to Sir Charles Ellis.

VISITS and SOCIAL EVENTS

Mrs. Haynes chats to her garden party guests at Pine Holme.

The staffs of the Bournemouth Undertaking and of the Institution are to be congratulated on the variety of visits arranged and on their organisation of complicated transport which added much to the comfort of all concerned.

On the Tuesday and the Wednesday, the Pitwines Works at Poole and the Bourne Valley Gas Distribution Centre were open for inspection. As is well-known, practically the whole of the former works was built on reclaimed harbour mudland, hundreds of 40 ft. piles having been used in the foundations. Gas making capacity is 21 mill. cu.ft. per day, the plant consisting of four Woodall-Duckham C.V.R. houses, and three sets of C.W.G. plant of total capacity 10 mill. cu.ft. per day.

On Tuesday, two coach-loads and a fleet of cars descended upon Bristol's Instrument Company at Weymouth. We refer at greater length to this visit on page 801.

Other visits were to:

(1) De Havilland Aircraft Co., Ltd.
(2) Hurn Airport, Christchurch.
(3) Vickers-Armstrongs, Ltd., at Hurn.
(4) British Drug Houses, at Poole.
(5) Royal Ordnance Factory, Poole.
(6) Tile Works of Carter & Co., Ltd., Hamworthy.
(7) Poole Generating Station.
(8) Wellworthy, Ltd., Lymington.
(9) Chalwyn Lamps, Ltd., Parkstone.
(10) Wallis Tin Stamping Co., Ltd., Hamworthy.

For the ladies special visits had been arranged, notably on the Monday to the pottery and showrooms of Carter, Stabler and Adams, Ltd., at Poole, and to the works and showrooms of Branksome Ceramics, Ltd., at Bournemouth. At the conclusion of these visits, Mrs. J. T. Haynes gave a garden party at her beautiful house 'Pine Holme.'

On the Tuesday afternoon there was a Ladies' Fashion Show and Tea in the Ballroom of the Royal Bath Hotel (by arrangement with Harvey Nichols & Co.). This was extremely popular, and we feel it our duty to record that a number of male delegates of all ages were too late to obtain tickets of entrance.

On the Monday evening there was a Civic Reception by the Mayor and Council of the County Borough of Bournemouth, followed by dancing in the ballroom of the Pavilion, and on Wednesday evening the official Institution Reception and Dance was also held there. Both functions were largely attended.

On the last day, Thursday, many of the men played in the golf meeting arranged by the S.B.G.I. (of which a selection of our Staff Photographer's work is published on pp. 750-751), while the official visit was to Salisbury and Stonehenge.

Mr. and Mrs. Jack Haynes receive their guests.

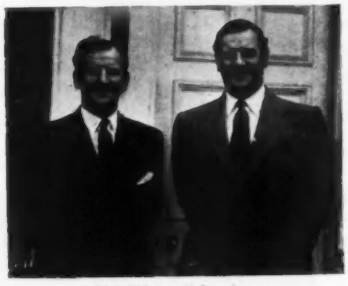
Looking up at Bourne Valley.

Looking up at Pitwines.

S.B.G.I.

ENTERTAIN THE INSTITUTION

—★—



The Woodall Brothers

Golf at Broadstone

In spite of the fact that the customary arrangement of holding the meeting on the Monday of Institution Week was not possible, there was no doubt of its success. Some 87 competitors played over the Broadstone course on the Thursday, and the many non-playing visitors included Mr. Jack Haynes, President I.G.E., who gave away the prizes. Here is a selection of photographs taken by Stephen Tennant, our Staff Photographer. Applications for prints should be addressed to 11 Bolt Court.

A. Docking and S. L. Pleasance

R. E. Mitchell and A. Pickard

K. Sheard and J. S. Marshall

T. V. Garrud and H. M. Thornton

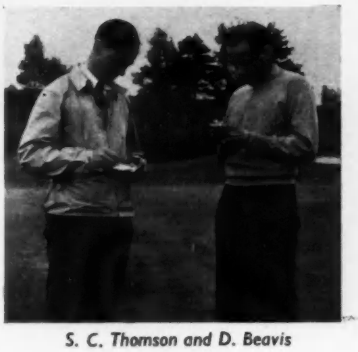
G. Ewart and F. P. Stammers

W. Morland Fox
A. Sadler
C. Evans

Brigadier C. A. H. Fairbank
C. Averill
H. G. Williamson

E. Spurrier
A. McFadyen
C. H. Pearson

J. H. Dyde and W. D. King



S. C. Thomson and D. Beavis

G. C. Wood and G. E. Jeffs

Darrell W. Rees and G. Kelly

W. Q. Foster and D. Syme

Prize Winners

The Coronation Plate was won by A. McFadyen (73), who is seen receiving it from Mr. J. T. Haynes (bottom right).

The runner-up (bottom left) was Darrell Rees (74).

The Thornton Cup was won by T. S. Ringrose (66), middle right, with J. Simpson, second with 70, and L. J. L. Walker, third with 71. J. Simpson (middle left) also won the Davis Cup with a 77.

A TRIUMPHANT DAY FOR JERSEY'S MR. PEPIN

*

Opening Ceremony on June 4 Brings New Era of Gas-Making to the Island

Mr. Pepin speaks before the official cutting of the tape by Lady Nicholson

The people of Jersey are a proud people and it is possible that they might take offence at the suggestion that they lead quiet lives. But it is unlikely that the Jersey Gas Light Company would deny that, apart from the 1940-45 German invasion when, after desperately trying to keep the works in operation, gas making stopped completely for eight months, the steady growth of the Company has been unmarked by many events of exceptional import. Gas has been produced in Jersey for nearly 125 years, almost a century of it under the auspices of the present Company, and throughout this long and honourable period we feel sure that no event has matched the brilliance of that which took place on June 4. This day saw the fulfilment of long-cherished hopes and the culmination of years of diligent planning. Certainly for Mr. Stuart P. Pepin, O.B.E., the Managing Director of the Company, it was a triumph.

The occasion was graced by some of Jersey's leading citizens. The Lieut-Governor, Admiral Sir Gresham Nicholson, was there with Lady Nicholson, who later was to open the works, and the Bailiff, Sir Alexander M. Coutanche, with Lady Coutanche, who inaugurated the new carbonising plant. Also present were Mr. G. C. Law, the State Engineer, Mr. C. S. Harrison, O.B.E., the Attorney-General, Mr. H. J. Grant, Constable of St. Helier, and many others. Among the visitors were Sir Frank Newsam, Permanent Under-Secretary of State, Home Affairs, and Mr. R. Kelf Cohen, Under-Secretary, Ministry of Fuel and Power. The gas industry contingent, led by the Institution President, Mr. J. T. Haynes, included Mr. G. E. Currier, Mr. A. G. Higgins, Dr. J. Burns, Mr. T. C. Finlayson, and other notabilities.

As the Heron slipped below the clouds and we peered down at the neat Lilliputian fields of this lovely island, it was difficult to believe that nearly 600 mill. cu.ft. of gas was consumed by its inhabitants last year and that increasing demand had necessitated the construction of a complete new installation to produce 3 mill. cu.ft. per day. That new plant was fully described and illustrated in last week's 'JOURNAL' and we do not propose to describe it again, save to comment that its architectural excellence and commendable working conditions are a credit not only to Jersey Gas Light and to the Woodall-Duckham Company, but also to the industry as a whole.

'An Historic Day'

After lunch at the Grand Hotel with the Deputy Chairman of the Company, Mr. C. W. Duret Aubin, presiding, the party moved to the works to witness the opening ceremony. Speaking from the dais, Mr. Aubin said that it was a great day in the life of the Company, and although it was regretted that their venerable and distinguished Chairman, Mr. J. A. Perrée, was unable to be a member of the platform party, it was nevertheless a matter for immense joy that he was no more than 10 yards away.

'This is an historic day for Jersey Gas and also for the Island of Jersey,' began Mr. Pepin. In 1830 gas from coal was first produced in Jersey, and in 1856 its manufacture was taken over by the founders of the present Company. It was in 1896 that the first works had been constructed in granite on sure and sound foundations. During the dark war years they had planned for the future and evolved a ten-year plan. It was completed in only nine years. First a steam raising plant was erected by April, 1948; then was planned and constructed the holder which was opened by Sir Alexander Coutanche in April, 1949. Meanwhile the contract had been placed for the wonderful new and scientific Woodall-Duckham plant. These developments had only been possible because of the co-operative effort of the staff and men and he would like to give his special thanks to the Engineer and Assistant Manager, Mr. W. Wedgwood, to the Secretary and Accountant, Mr. H. R. Lamerton, and to all the staff, craftsmen, and unskilled workers.

'We have been a happy family for 15 years,' concluded Mr. Pepin, 'and we are going to continue to prosper. We are proud of the part we have played in the economic life of the Island, and also of England, because we are going to make the best possible use of the nation's fuel—coal.'

A Wonderful Job

And then, after congratulating the Company on the 'wonderful job you have done for the happy community life of our Island,' and wishing it every success, Lady Nicholson cut the tape and so officially opened the works. Later Lady Coutanche inaugurated the new carbonising plant.

When the inspection of the works was concluded, visitors from England (or 'the mainland,' to use local parlance) were taken on a short motor tour of the Island before their return. They left with regret, not only because the beauty of Jersey had exerted its usual spell, but because their hosts had shown a warmth of welcome and personal kindness all too rare in these days of high pressure hospitality.

Lady Coutanche receives a handshake after throwing the lever that set the carbonising plant in motion.

THE BRIGHTON INSTALLATIONS AT PORTSLADE

The three installations of W-D Continuous Vertical Retorts at the Portslade Works of the South Eastern Gas Board.

The first installation commenced gas making during September 1953, the second was in operation by the end of the year and the third will be at work later this year.

The total gas making capacity is over 15 million cu. ft. per day. The design is such that a fourth section can be added in the future to increase the capacity to over 20 million cu. ft. per day.

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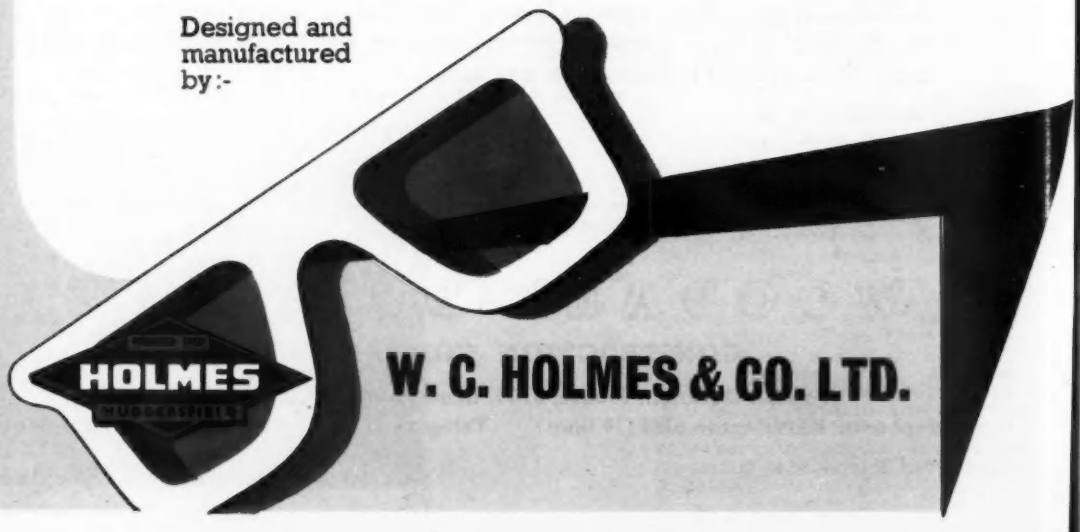

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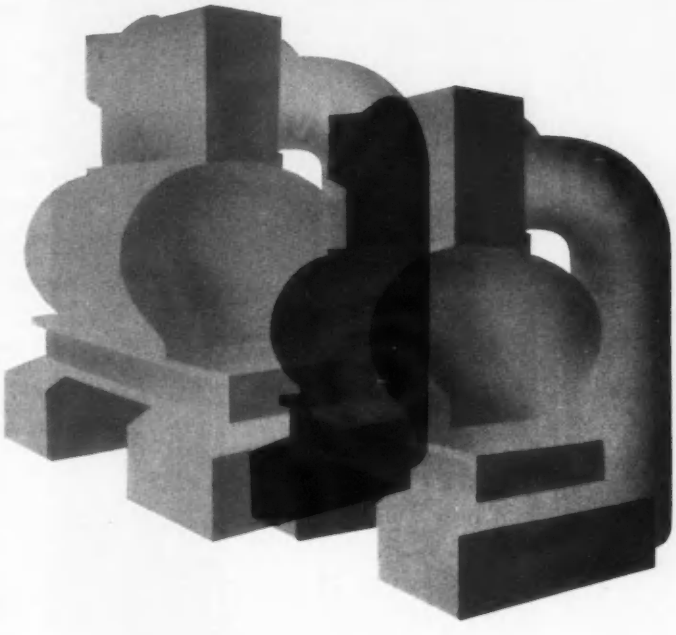
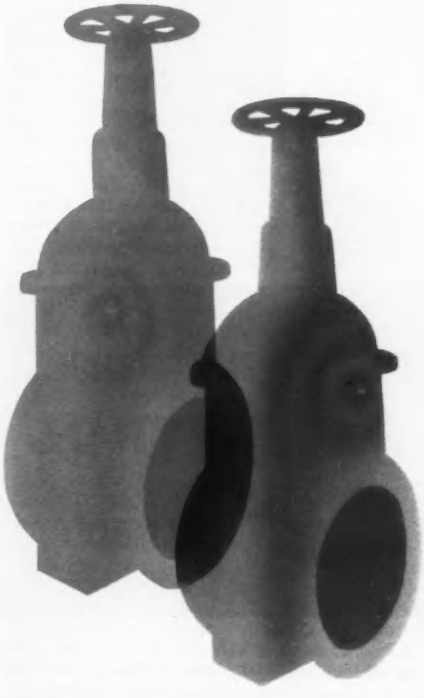
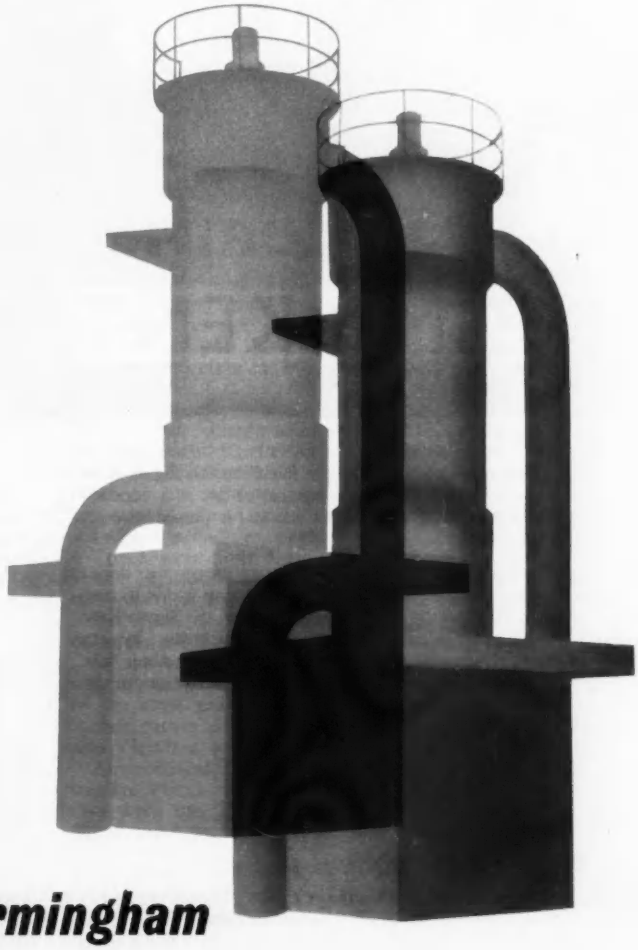
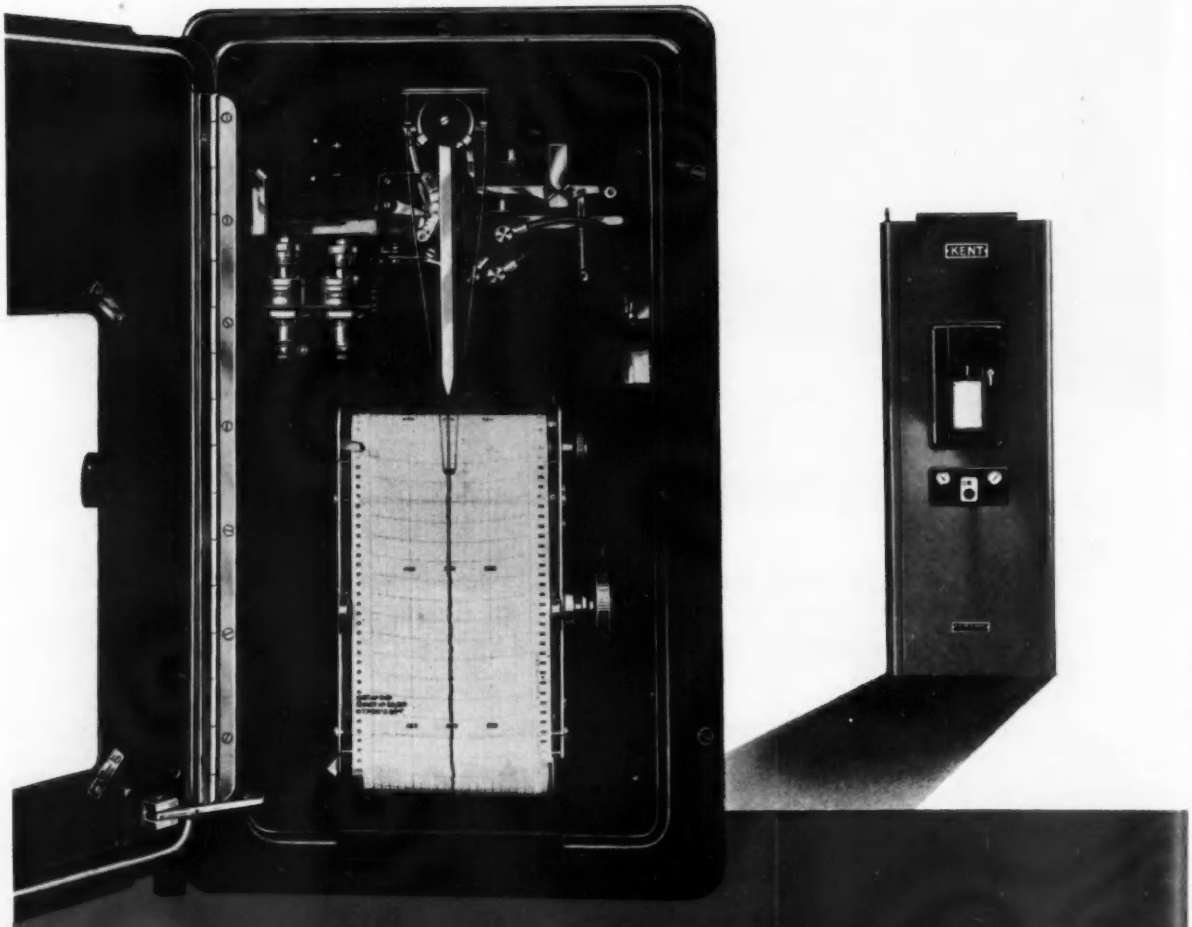






HUDDERSFIELD

also at London and Birmingham



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Consisting of a gas-flow regulator, measuring device and recording mechanism, and incorporating within its case the KENT mark 20 pneumatic controller, the Sigma-Kent Calorimeter regulates dilution and enrichment by the controlled admission of producer gas, blue water gas, carburetted water gas, butane, natural gas, waste gas, or air.

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Millom . . . . N. Western Gas Board
Ilfracombe . . . S. Western Gas Board
Vauxhall . . . S. Eastern Gas Board
Greenwich . . . S. Eastern Gas Board
Rotherhithe . . . S. Eastern Gas Board
Staveley Iron & Chemical Co. Ltd.
Ford Motor Co. Ltd.
Pancevo Glass Works, Jugoslavia

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The illustrations show the Calorimeter (left) with door open, and (right) mounted in a KENT unit panel

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ORGANISATION IN THE SOUTH WEST

FROM A PAPER TO THE INSTITUTION OF GAS ENGINEERS ON MAY 31, 1954, BY

C. H. CHESTER,

C.B.E., M.I.Mech.E., M.Inst.Gas E., Chairman, South Western Gas Board.

The paper deals with the subject in three phases—a survey of the industry in the South West prior to the Gas Act, 1948; the first five years of the South Western Gas Board; and the future. We give abstracts of the first two phases and a more extended version of the author's look into the future.

The paper presents a factual account of the organisation of the industry in the South Western area from the inception of the Board at vesting date, its development during the first five years of the life of the Board with consequential reorganisation, and plans for the future.

Mr. Chester permits himself the interesting remark that the South West may be described as classic ground in the history of the gas industry, containing as it does Murdoch's home in Redruth from 1782 to 1798. Several of the gas companies in the area were established by Acts of Parliament dating before 1820. These include such important undertakings as Exeter, Bath, Cheltenham, Bristol, and Gloucester.

The area administered by the Board occupies about 8,400 sq. miles, roughly 250 miles long extending from 10 miles beyond Evesham in the north to Land's End in the south, from 10 miles west of Ross-on-Wye to the same distance east of Swindon and along the south coast to a few miles east of Seaton. Prior to 1949, there were 105 gasworks in the area, varying in annual output from 5,900 mill. cu.ft. to 2 mill., with a total of 25,500 mill. cu.ft. Of the 104 undertakings vested in the South Western Gas Board, 60 were statutory, 44 were non-statutory, 46 were owned by five holding companies, 46 by independent companies, 10 by local authorities.

Many of the works were small, 13 making less than 10 mill. cu.ft. per annum, 23 from 10 to 20 mill, six from 20 to 30, 17 from 30 to 50 mill.; 'No less than 72 of them using stop-ended horizontal retorts unable to afford adequate technical control although a number of them had benefited to some extent by the activities of the holding companies that took them over.' Tables of daily capacity, annual output and approximate average ages of gas-making plant justify the conclusion that 'there was a large reserve capacity of coal-gas plant immediately before the war and that in 1939 the age of the coal gas plant was about 18 years as compared with the life of 40 years for coal-gas plant adopted by the gas industry after vesting date for depreciation purposes. There is good reason to suppose that the other fixed assets were in a very similar condition before the war and provided a similar reserve of capacity.'

The position of plant, capacity, sales and prices immediately prior to vesting date is summarised as

(1) (*a*) 104 separate undertakings operating 105 separate works vested in the Board.
(*b*) These undertakings varied in size between 22 mill. cu.ft. per day and 2 mill. cu.ft. per annum.

(2) (*a*) In spite of certain additions during and immediately after the War, the maximum daily capacity of coal gas plant only rose by about 20% between 1939 and 1948 as compared with an increase of 40% in the sale of gas, the balance of capacity being made up by an increase of 80% in water gas plant.
(*b*) The average age of coal gas plant rose from 18 to 22 years between 1939 and 1948, an increase of 22½%.
(*c*) The expenditure on maintenance, including either renewals or depreciation, of certain types of plant and mains, had been considerably curtailed during the war, with the consequent deterioration both in the plant itself and in the service to consumers.
(*d*) Owing to the restrictions on the price of gas and in some cases to the effect of excess profits levy, the industry's total reserves applicable to the maintenance and renewal of assets only amounted to £1.75 mill. at vesting date, and were quite inadequate to meet the essential costs of rehabilitation.

(3) During the years 1938 to 1949-50,
(*a*) the sale of gas increased by an average of 3¼% per annum compared with a national average increase of 2% per annum over the previous 20 years.
(*b*) The consumption per consumer, all classes, increased from 137 therms to 172 therms per annum, and the national average consumption per prepayment consumer increased from 76 therms to 116 therms per annum, having reached a peak of 120 therms, in 1947, due primarily to solid-fuel shortage.
(*c*) the average price of gas rose from 8.75d. to 14.5d. per therm, an increase of 66% compared with an increase of 153% in the delivered price of coal, and 104% in the level of wage rates.

Gas Production

An analysis of coal gas plant in the area in the pre-vesting year 1948 shows that 9.2% of the total coal gas was made in horizontal retorts, stop-ended and presumably hand-charged, 43.0% in machine charged horizontals, 41.3% in continuous verticals, 6.5% in intermittent verticals. There were no coke ovens or coke-oven gas supplies. 42 works made carburetted water gas in 16 hand operated, 16 semi-automatic and 10 fully automatic plants, 54 works supplied gas at a 'declared' calorific value. Eleven works 'declared' at 500 B.Th.U./cu.ft., 13 at 475 and 16 at 450, one as low as 425. It is noted that 'from July 1, 1953, all gas distributed was standardised at 470 B.Th.U. per cu.ft., with the exception of one works making Tully gas and one with a butane/air installation.

By-Products

Preparation and marketing of coke and breeze varied widely. Many small works had no screening or debreezing, and even of the larger works comparatively few had adopted the Institution's standard gradings. This caused confusion in transferring coke supply from one district to another. Unsuitable sizes led to 'a tendency for both consumers and merchants to regard coke as inferior to other solid fuels.' Undertakings around Gloucester and Cheltenham were members of the Midland Coke Association while, with the exception of Cornwall, most of the others were members of the London and Counties Coke Association. But there were difficulties with price schedules, particularly in Cornwall.

There were four tar-distilling plants in the area—at Truro, Plymouth, Exeter and Swindon—but the process did not generally extend far beyond the preparation of road tars. There were also five tar-dehaydration plants. All other tar made was passed to the co-operative tar distillers.

Of the benzole recovery plants, there were 21 using oil-washing rated at an annual capacity equivalent to 59% of the total gas made in the area, and nine using active carbon rating at 19%, but the amount of benzole extracted was variable.

Ammoniacal liquor was disposed of by most of the smaller works 'by any means that avoided consequences that were too serious.' Some of the larger works produced sulphate, others crude concentrate liquor.

Distribution

In general, distribution, particularly in the smaller undertakings, was unsatisfactory. Wide variations were revealed in consumer service, appliance fitting and maintenance,

even in adjoining undertakings. Sales and service policy hire and hire purchase, meter rents and maintenance differed considerably in different districts. 'Many districts had no showroom at all.' Home service was beginning to get back to normal in 1949. Staffs were depleted, and only one home service adviser was available per 5,000 consumers. Industrial gas was confined principally to the Bristol area which in 1932 had seen the formation of the first organised industrial section.

Labour

At vesting date there existed throughout the area numerous rates and conditions of labour. This variation was mainly due to the fact that the territory was divided between three negotiating bodies, the South Western, Southern and Midland Regional Councils. Some undertakings were not members of the Federation of Gas Employers, and both members and non-members adopted rates of pay and conditions of service differing from those ruling in the rest of the area. With regard to employees services, 'some undertakings ran progressive education and training schemes and gave generous financial assistance to employees for studies, while others regarded this matter as an unnecessary trimming.'

The First Five Years

The area contains a population of about 3 mill., of which 40% is located in the larger towns which are few and far between, and only two of which have a population exceeding 100,000. The average density of population is 35.9 per sq. mile compared with 556 for Great Britain. Urban industry is largely confined to Bristol, Swindon, Gloucester and Bath in the north, Exeter and Plymouth in the south, apart from numerous holiday resorts; the remainder is agricultural and moorland (Dartmoor and Exmoor).

Eleven of the larger manufacturing units were provisionally selected as centres which would be retained and developed into major production centres, and which could form nuclei of 11 sub-divisions of the area. They were Bath, Bristol, Cheltenham/Gloucester, Weston-super-Mare, Swindon, Taunton, Exeter, Barnstaple/Bideford, Torquay, Plymouth/Devonport and Truro. Managers were appointed to each sub-division, all, with four exceptions, former managers of the main undertakings, sub-divisional boundaries were governed by those of the main undertakings extended to include adjacent smaller undertakings and by convenient geographical characteristics.

The sub-divisions were grouped into two divisions, five in the Northern and six in the Southern Division. A General Manager was appointed to each division. The two General Managers were the principal executive officers of the Board, attending all Board meetings and implementing the decisions of the Board each in his own division. Their headquarters were located at Bristol in the north and Torquay in the south. Divisional executive committees were set up each with sub-divisional managers as members and the divisional general manager as chairman. The two committees met monthly to consider the implementation of Board decisions which affected them, to discuss new projects, and generally to consider, and to keep all sub-divisional managers informed of, the whole of the Board's policy and results, 'keeping each sub-divisional manager conversant with the affairs of his colleagues—stimulating healthy competition.' Area officers frequently attended these meetings.

Decentralisation was a basic feature of the organisation, but certain services were concentrated at headquarters. The legal and secretarial work of the Board was combined in one department. 'Head office dealt with all financial services to the Board and initiated standard accounting and financial procedures.' Area scientific headquarters were established at Bristol, under the control of an Area scientist, at the central laboratories of the former Bristol Gas Company. In addition to laboratory work, fuel efficiency surveys were continuously carried out by a small team of technicians, resulting in considerable savings. Purchase and distribution of coals, movements of coke and other transport were controlled by an area officer. An industrial relations officer dealt with the establishment and maintenance of machinery for the negotiation of terms and conditions of employment, and the promotion of welfare, health, education and safety of employees. An area industrial gas engineer was appointed to co-ordinate policy in industrial gas utilisation with sub-divisional managers.

The general policy of integration provided for the retention and development of a comparatively small number of selected central manufacturing stations from which bulk supplies will be made to all other manufacturing stations which will eventually be shut down except for gas storage and distribution purposes. It was decided that it was in this direction that lay the greatest opportunity for substantial economies, while economies in other directions were not to be neglected. Speed of development depended primarily on the availability of cast-iron pipes. Distribution of pipes was brought under one control enabling priority to be given to integration links giving the optimum revenue return. Integration schemes to the value of £3.20 mill. have been approved by the Board. Figs. 1 and 2 (reproduced on p. 760) show location and approximate future capacities of the proposed permanent manufacturing stations compared with the 105 manufacturing undertakings originally vested in the Board.

Progress with high-pressure bulk supply mains to March 31, 1954, is shown in Fig. 3, while the system as planned for 1960 is shown in Fig. 4 (p. 761). 'All interim integration schemes have been designed to conform with the major projects and all that have been authorised by the Board so far have been justified on an economic basis.' Preference has been given to those schemes which would enable the closing down of small works in poor condition and many works are being 'run down' during the interim stages.

In this area there are hundreds of villages and isolated communities lying between the major works. These present a large potential demand. Bulk transmission mains are, therefore, planned to pass through these communities with supply facilities direct from the high-pressure mains. 'The fact that such supplies tend to upset the ideal load factor must be subjugated to the need for additional sales and rigid economy in materials, since by no other method can an economical supply be effected.'

Major manufacturing stations are being inter-connected either by direct linkage or by the partial overlapping of high-pressure distribution systems. Inter-connection enables load to be transferred from one station to another. Among the advantages of inter-connection is the ability to place selected works on base-load operation. Conditions favourable to such operation have not yet arisen in the South-West, but the Board is fully aware of the many advantages that may accrue when the opportunity presents itself.

'It is pleasing to record that at one period during an exceptional spell of cold weather this year the demand for gas in the Bristol area exceeded plant capacity by no less than 16.28%, but, due to interconnection with Bath and Swindon, the load was satisfactorily met.'

Another advantage of inter-connection which is remarked upon is that it may render possible the spreading of repair and resetting programmes over the whole year, instead of concentration in the summer months, 'resulting in major economies.'

Gas Compression

Bulk supply systems are being designed to work at an initial pressure of not more than 15 lb./sq. in. for the first two years and at not more than 30 lb./sq. in. to meet estimated future loads over the ensuing 15 years. The systems are estimated to pass the maximum day's requirements in 20 hours with pumping at a continuous rate over the 24 hours. To keep diameters of mains within limits, relay compressing stations will be provided at strategic points. These stations will be entirely automatic, capable of running without attendance. The stations will have two compressors, one diesel driven and one electrically driven with variable speed control. The positioning of these relay stations, both as now existing and as projected, is described.

'Economics of Integration' is illustrated by details of savings effected in the Plymouth and Cornwall Division

which are tabulated. The area is about 1,900 sq. miles, 85 miles in length by an average width of 20 miles. It contains 30 separate manufacturing units. A new central works is under construction at Newham on the Truro river. The Board was committed at vesting date to extensions at Penzance and Newquay. Manufacture will be continued at these works until they are worn out, but all future extensions will be at Newham (Truro). At Plymouth are two works, Devonport (formerly Corporation of Plymouth) and Coxside (formerly Plymouth and Stonehouse Gas Cmpany). The Devonport gas-making plant is a 5-mill. bench of horizontals, now interlinked with Coxside and operating on base-load. All future extensions will be at Coxside. Thus the Division is at present served by five works which will be ultimately reduced to three or even two.

Finance

At the end of the fifth year from vesting date, the accounting organisation had reached a point where

(1) In the sub-divisions the whole of the accountancy was concentrated at one office from which most of the meter reading and collection was also carried out.
(2) The preparation and despatch of gas bills was done at the two divisional offices, in Bristol and Torquay, with the aid of 'National' accounting machines. At each of these two offices there was also a small 'Powers' punched-card installation dealing with the analysis of wages, stores, petty cash, etc.
(3) The payment of cheques and analysis of expenditure for the whole area was done on a 'Powers Forty' punched-card installation at the head office, thereby reducing the number of cheques paid by two-thirds as a result of sending only one cheque per month to most suppliers. In addition, the following functions were carried out at head office:—
    (i) Payment of all salaries,
    (ii) The operation of some 22 pension schemes in addition to the Board's main scheme.
    (iii) The central registration and collection (in conjunction with the secretary and solicitor) of all arrears of debts; and
    (iv) all insurance, rating, and taxation matters.

Fixed assets and capital charges are tabulated. In the first four years the Board approved projects to the total value of over £16.5 mill., which is to be compared with the original cost price of all fixed assets valued at slightly more than that figure, It can be seen from the tables that capital charges are rising and that in about 10 years, when the major works are completed, these will be in the region of 4½d. per therm—not more than double the average pre-war charge for interest, renewals and depreciation.

With the growing popularity of the South West as an all-season holiday resort and 'place of retirement,' population is increasing at a somewhat higher rate than the national growth. 'With the post-war housing programme well under way, the number of consumers increased half as fast again during 1949-53 as during the previous 10 years, and at least 80% of the tenants of new housing estates received a supply of gas, mainly for cooking and water heating.' A large number and variety of tariffs were in operation at vesting date. By May 31, 1952, these had been reduced to four types of tariffs each in five zones. These are two types of reducing price block rates and two optional tariffs (one two-part) for non-domestic consumers.

Capital (fixed assets) per million in the South West is compared with that in other areas. It is seen to be relatively high; this is partly explained by the relatively few local authority undertakings (with low capitalisation) in this region.

The legal controversy over new tariffs published in June, 1949, is recalled. These tariffs were designed to meet the estimated deficiency in the trading of the first 11 months. They ultimately became effective just before the end of the first financial year.

The following statement shows savings achieved by the measures adopted so far:—

(1) The thermal yield of gas before benzole recovery was increased in the three years from 1949-50 to 1952-53 by 2.0 therms per ton of coal carbonised, equivalent to a saving of 43,000 tons of coal, which at the present-day net price of coal, after deducting residuals, shows a financial saving of £100,000 per annum.
(2) The amount of coke and breeze available for sale or for use in water gas manufacture was increased in the three years by 0.5 cwt. per ton of coal carbonised, equivalent to 37,500 tons per annum, which at the present-day net realised prices of coke and breeze produces additional revenue of £150,000 per annum.
(3) In the three years from March 31, 1950, to March 31, 1953, the numbers of employees were reduced by 701 (8%) at a saving of some £300,000 per annum, in spite of a considerable increase in the quantities of sales of all kinds.
(4) The average price of gas between vesting date and March 31, 1953, increased by only 3.5d. per therm or 23%, after allowing 1d. per therm to cover the deficiency of revenue at vestnig date, as compared with an increase of 42% in the official figures of wholesale prices.
(5) The above results were achieved in the face of constant increases in the prices the Board had to pay for its materials, labour and services, of which the following are examples:—
    (*a*) Between vesting date and March 31, 1953, the delivered price of coal increased by 25s. 5d. per ton, equivalent to £1,861,500 per annum, or about the amount recovered as a result of the various increases in the price of gas.
    (*b*) Between vesting date and March 31, 1953, the cost of wages and salaries increased by some 25%, equivalent to about £600,000 per annum on the present number of employees.
    (*c*) The amount provided for depreciation and interest rose between the first year and the fourth year of the Board's operations by £463,000 per annum, and it is estimated on the basis of present-day costs that by 1960-61 the increase will be about £1.582 mill. per annum as a result of projected capital expenditure.

The fourth year of operations was closed with a small accumulated surplus.

New works are under construction at Stapleton Road, Bristol, and at Truro, together with additions to various plants elsewhere. The chief points noted in this connection are:—

(*a*) The installation of continuous vertical retorts or intermittent vertical chambers, depending upon the types of coal to be carbonised. The general trend of the overall installed capacity of the different types of plant is as shown in Fig. 5 (p. 762). Apart from consideration of gas manufacture, an important factor influencing decisions relative to carbonising plant has been the increasing attention rightly given to atmospheric pollution, which, of course, will always remain a problem with horizontal retorts.
(*b*) The installation of mechanical producers to provide fuel for heating the retorts. It is being increasingly recognised that, apart from considerations of fuel economy, the manual clinkering of producers is a task that is not likely to be performed economically in the future.
(*c*) The increased use of waste-heat steam for the generation of electricity and the sale of surplus current to the grid after full works electrification.
(*d*) The use of methods other than the conventional dry-box purifiers for the removal of hydrogen sulphide.
(*e*) The use of liquid petroleum gas/air plants in certain isolated localities where integration mains would not be an economic proposition.

Fuel Efficiency Surveys

The operations of 'the small mobile staff, consisting of three technical assistants,' are of great interest. They apply themselves to operations in detail, 'co-operating with the staffs on the respective works without interfering with their authority or accepting their responsibility. So far, 70 initial surveys and 35 re-surveys have been made at a cost of the order of 3% of the calculated savings.' Examples of actual savings effected are given, steam

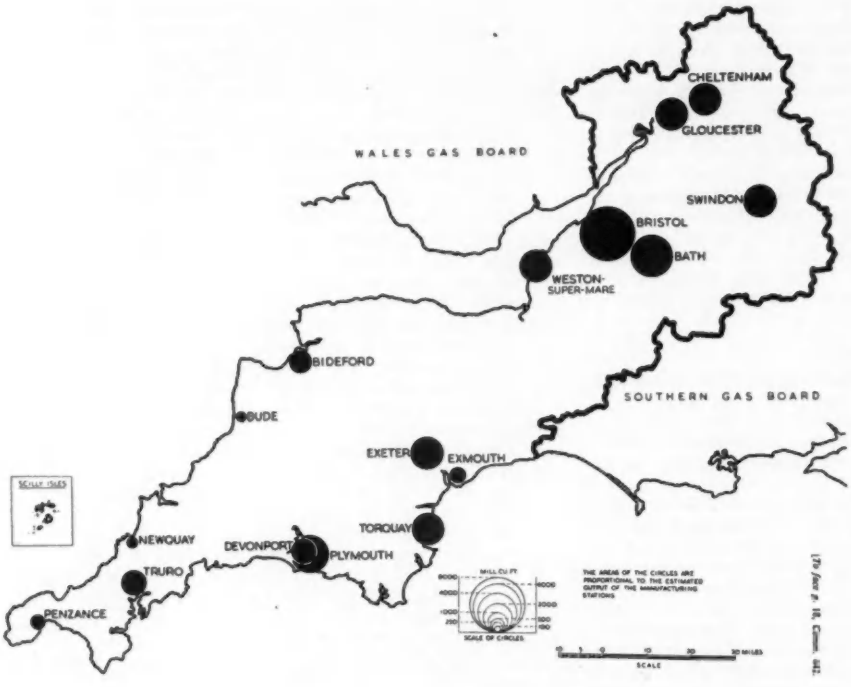

Fig. 1.—Location and size of permanent manufacturing stations in the area of the South Western Gas Board.

leakages, coke breakage, together with some items of work in hand under the headings of 'indirect economies.' Some of these are listed:—

(1) Savings to be effected, particularly on horizontal settings, by an extension of the hydrocarbon enrichment value (H.E.V.) survey, which formed a part of the fuel efficiency surveys, in order to reduce the loss of gaseous therms by undue pyrolysis, or by leakage or burning of the gas due to defective retorts or bench ironwork.

(2) As a corollary to (1) above, it may be possible in some cases to increase the tar yield, or to improve its quality.

(3) In connection with vertical retort settings, savings may be made by avoiding, where possible, an excess of unconverted steam which, even if obtained from waste heat, could be used for other purposes, while an excessive and unnecessary load on the gas condensing plant could be reduced and water pumping charges lowered.

(4) An investigation is envisaged into the efficiency of oil cracking in carburetted water gas plants, in those cases where results appear to indicate the necessity for such a procedure.

(5) A survey of all water-treatment plants in the area.

The sizes and descriptions of coke recommended by the Institution of Gas Engineers were adopted throughout the area. Domestic sales are rising rapidly. In one town

Fig. 2.—Location and size of manufacturing stations as at vesting date, May 1, 1949.

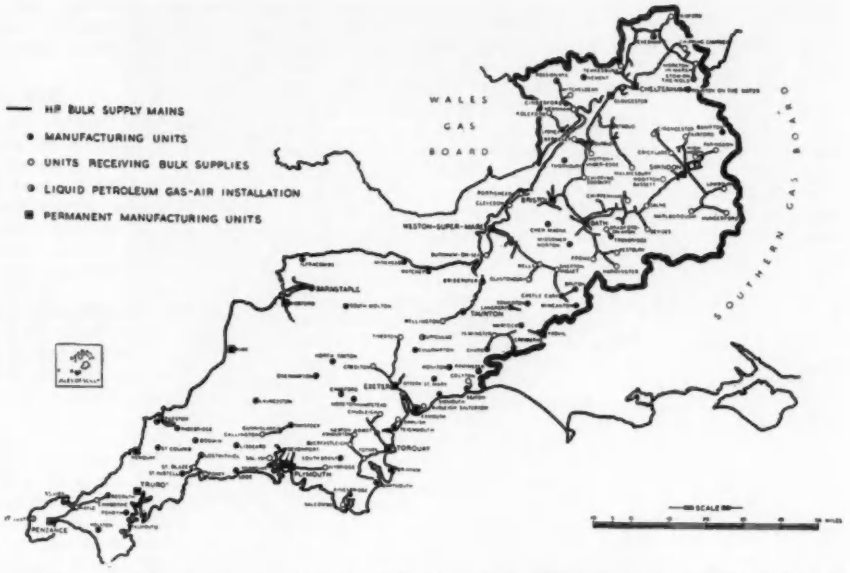

Fig. 3.—High pressure bulk supply mains as they were at the end of the first five years of nationalisation.

direct deliveries to small domestic consumers have increased from 3,500 to 14,000 tons per annum, the total sales being now over 20,000 tons.

Twenty consumer service schemes and changes in sales methods in the domestic field are listed. The problem of industrial sales is briefly described. Potential large consumers are visited by senior technical representatives but there is 'the difficulty of providing men with suitable technical training not only to cover heavy commercial loads, but also to deal with the industrial problems where they occur.'

The Board, realising that its present organisation might not necessarily be the best possible, appointed in January, 1953, a Reorganisation Committee comprising its senior officers, to make recommendations. The Report of the Committee and its recommendations were accepted in October, 1953, and the new organisation became effective on April 1, 1954.

Among the recommendations were that:—

(1) In view of the fact that all manufacturing plant will ultimately be concentrated in 12 works, decisions governing plant in use, transfer of gas between centres and extensions to manufacturing plant should be under one central control.
(2) Trends since vesting date 'call for a functional accountancy department.'
(3) Many of the duties now carried by the sub-divisional manager 'should be dispersed to specialists.'
(4) Consumer service should become one of the main features in the new organisation.
(5) Increased specialisation 'to gain greater technical efficiency and standardisation.'
(6) The elimination of the two divisions.

Reorganisation in accordance with these recommendations is described in the fifth and last section of Mr. Chester's paper. This section is here reproduced in full.

THE FUTURE

Decentralisation

The policy of decentralisation in large organisations, and in particular in the publicly owned industries, has been acclaimed; and it is a point of view that must arouse much sympathy. Nevertheless, it is necessary to keep it in perspective and not be swayed by all-informed or uninformed opinion sometimes vociferously expressed. Many of the critics who cry frequently for more and more decentralisation are probably, in reality, protesting against the necessary restrictions inherent in a large-scale publicly owned body, or perhaps even against the very principle of public ownership. The whole principle of national

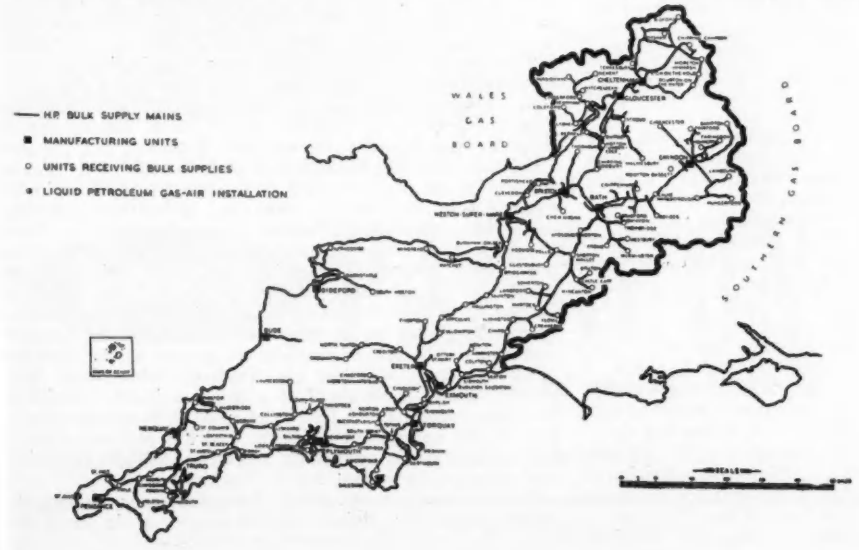

Fig. 4.—High pressure bulk supply mains as planned for completion by 1960.

control—the bringing together of a large number of formerly separately owned undertakings under one management—is bound to restrict the freedom and independence enjoyed in the past.

It has already been pointed out that as one of the purposes of nationalisation was to raise efficiency by introducing a measure of central planning, co-ordination and specialisation, it is inevitable that there should be some restriction of the operational managers' powers. Frequently, the complaint is heard that a manager cannot spend more than £250 without seeking approval of some higher authority, yet how many managers in the past could spend even £250 without going to their board of directors? The present difficulties with respect to limited capital expenditure, public accountability and the statutory responsibilities of the area boards, demand some degree of central control. Unlike the Coal Industry Nationalisation Act, 1946, the Gas Act, 1948, provided for the establishment of 12 area boards to which complete authority is delegated. This in itself is surely some considerable degree of decentralisation.

Specialisation

During the past 25 years, more and more specialisation has been taking place within the industry. The days of the old 'engineer and manager' have given way to the

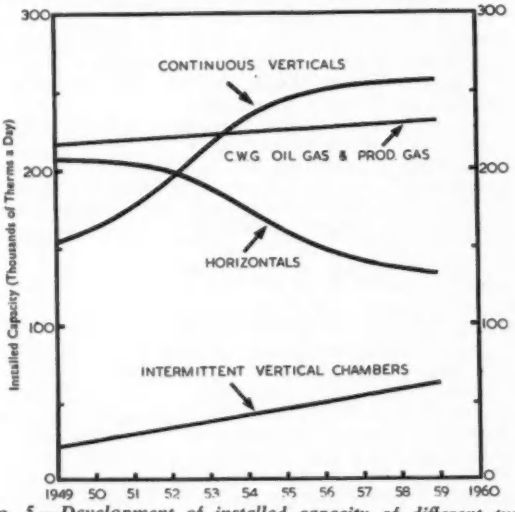

Fig. 5.—Development of installed capacity of different types of plant.

highly qualified specialist operating in one particular sphere of the ever increasing technicalities of the science of the manufacture and distribution of gas, together with the attendant commercial and accountancy fields: the present-day cost of capital, coal and labour, together with keen competition from others in the fuel industry demand this change.

To keep in step with this modern trend is desirable, and its adoption is facilitated by public ownership. To be economic, the employment of specialists requires a large organisation, and an area gas board must certainly fall within this heading. With 76 of the original 105 undertakings in the South Western Gas Board each making under 100 mill. cu.ft. per annum, the gas engineer had to carry out all the functions of the gas business under the omnibus title of 'engineer and manager.' One of the main purposes of public ownership is to increase technical efficiency, and this can best be done by specialists co-ordinating over a wide field, but within a defined sphere.

It has been shown that the past organisation of the South Western Gas Board was entirely non-functional and based on that which largely existed prior to vesting date. In most cases, the engineers and managers of the largest works within a sub-division were appointed sub-divisional managers and assumed responsibility, not only for all other works within the sub-division, but for all functions—production, distribution, accountancy, consumer service, industrial relations, etc. It was found necessary, in planning the Board's new organisation, to reduce these too onerous duties and to disperse some of them to specialists.

New Organisation

In its final report, the Committee stated that, in its opinion, reorganisation was necessary to ensure continued efficiency in view of the changing circumstances. Its main recommendations were as follows:

(1) That the production of gas, the maintenance of works together with new distribution projects of a capital nature shall be segregated and form a straight-line or functional department under the control of a chief engineer.
(2) That accountancy shall also be segregated and form a similar functional department under the control of a chief accountant.
(3) That the area be portioned into six divisions, each division being under the control of a divisional engineer and manager.
(4) That each division be sub-divided into a number of districts, each district being under the control of a district engineer and manager.
(5) That the chief engineer's staff shall consist primarily of an area production engineer and an area distribution engineer. Six divisional production engineers, directly responsible to the chief engineer, shall control all production matters in each division.
(6) That each manufacturing station (or group of stations) shall be under the direct control of a station engineer, station superintendent or station foreman (according to size), who shall be directly responsible to the divisional production engineer.
(7) That a divisional engineer and manager's staff shall consist primarily of a distribution engineer, a commercial officer, and an industrial gas engineer.
(8) That divisional distribution engineers shall be responsible to the chief engineer for all capital distribution projects.
(9) That area staff (other than those mentioned above) shall consist of the secretary and solicitor, area scientist, personnel manager, coal, coke and transport manager, industrial gas engineer, medical doctor, and a development manager.
(10) That six standing committees be set up as follows:—
(*a*) Chairman's or Management Committee.
(*b*) Production Committee.
(*c*) Distribution Committee.
(*d*) Consumer Service Committee.
(*e*) Accounts Committee.
(*f*) Establishments Committee.

In addition, other recommendations were made appertaining to the status of senior officers and, in particular, to the membership of the various Committees enumerated above. This is as shown in Figure 7 (p. 770).

In view of the short time the new organisation has been in existence, it is not possible to give a review of its operation. Only over a span of years, and by increased technical efficiency and reduced overall costs, can results be judged. The Board feels confident, however, that the new administration will facilitate progress and lead to greater success in the future by the concentration of effort in the right places. It is true to state that, whilst there has been some measure of centralisation in certain directions, there has been as great a measure of decentralisation. On the production side, the disposition and construction of new plant, the base-loading of selected works, the siting of additional storage, planning of the high-pressure distribution system and the shutting down of the small works—and, above all, the production of therms at the absolute minimum cost—all these and kindred matters have been brought under the control of a chief engineer. Similarly, the chief accountant is free to proceed with the mechanisation of the accountancy services and the concentration of the work on consumer billing by the most modern, efficient and cheapest form that can be devised.

It is, however, to the field of consumer service that the Board looks for major improvements. It is upon the

(*Continued on p. 767*)

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. . . SAYS THE GAS FITTER

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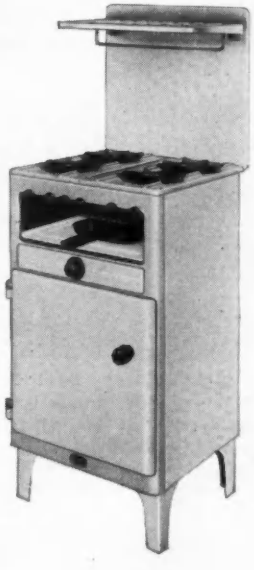

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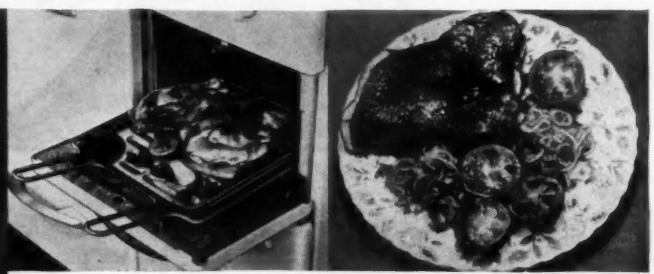

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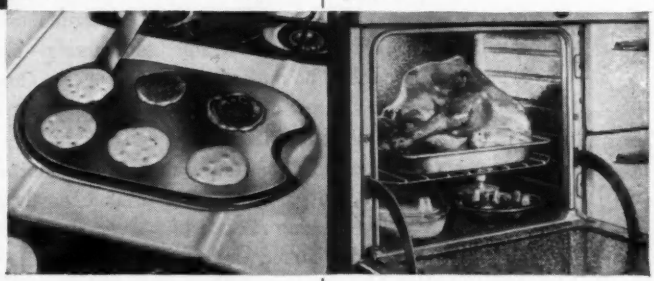

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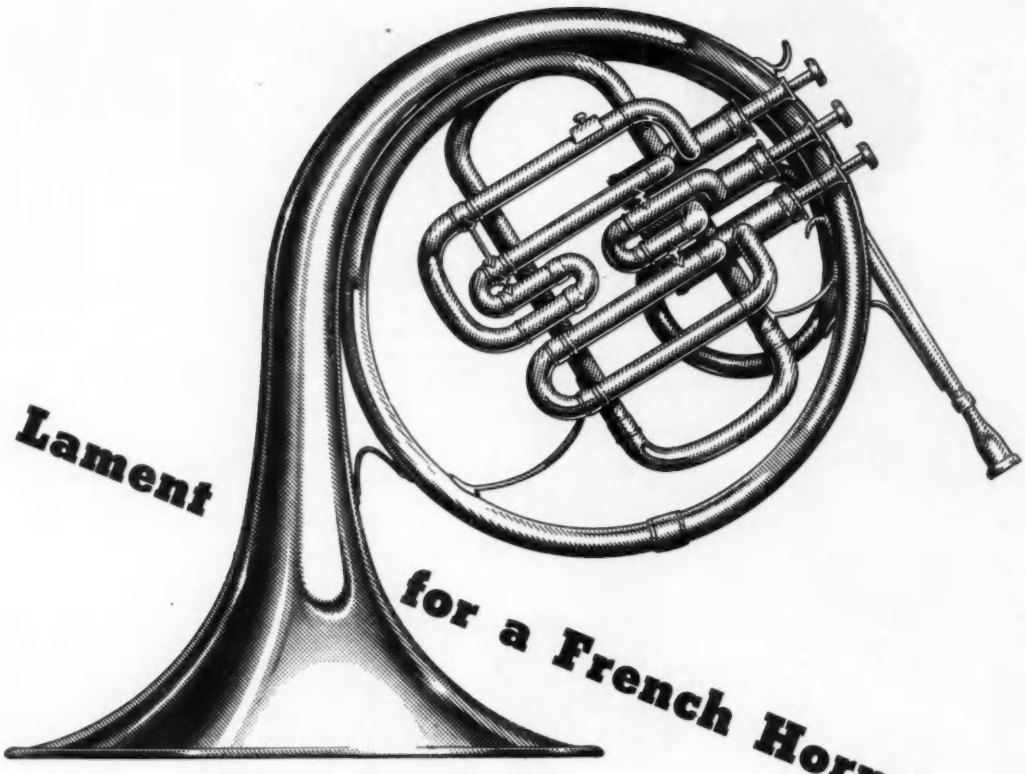

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vitality and success of this most important section of the Board's operation, which includes all consumer contacts, appliance sales, the development of gas sales, and the maintenance or improvement of consumer relations, that the continued expansion of the Board principally depends. It is anticipated that consumer service and relationships will show a marked improvement by the full and complete decentralisation of this function and by increased responsibility to local and personal management.

As has been shown, each division has been broken down to a number of districts, each under the control of a district manager, who, freed from all production and major distribution worries, can devote the whole of his efforts to serving the consumer and the development of gas sales. He is responsible for local mains, meters, stores, appliances, gas fitters, salesmen and showrooms and appliance fixing costs. Known locally, he represents the Board in the eyes of the public. He is the 'man in the shop window' and, so far as the housewife is concerned, represents the gas industry.

Financial Aspects

Financial Organisation and Management.

During the first five years, the Board's accounting organisation was gradually consolidated into the 11 subdivisional offices, with certain important and specialised functions carried out at the divisional offices and the head office. In other words, some considerable progress had been made towards units of a size sufficiently large to justify a skilled staff with an up-to-date mechanised system. In some ways, the greatest achievement was proving to the satisfaction of everyone that prime documents (*e.g.*, meter-reading cards) could safely and regularly be sent over a long distance of 100 miles and more to a machine centre for processing (*e.g.*, making out and despatch of gas bills) without any serious difficulties arising.

As a result of its various investigations, the Board decided to include as a fundamental part of its new organisation a central mechanised accounting office at Bath that would deal with all accounting matters, except those which very broadly came within the term 'prime entries,' which must be carried out on the spot. For the convenience of staff control and consumer relations, all employees engaged on prime records will, in future, be under the control of the district manager or station engineer, as the case may be, and all the other accounting staff will be under the control of the chief accountant.

It is anticipated that complete centralisation of accounting functions will be completed in not less than five years, as three years will be required for the planning and delivery of machines and a further two years will be taken up in the gradual transfer of work to the centre, function by function. The general object of the changes in the financial and accounting organisation is, of course, a better service to the consumers and to management, but the Board has good grounds for expecting that, when complete, the new organisation will prove to be more efficient and cheaper than the old, both in money and manpower.

Fixed Assets, Buildings, Plant, Mains, etc.

The Board's plans for concentrating production in only 12 to 16 works and the closing down of the remainder in the next 10 years or so, will, in fact, be completed, to a great extent, by 1960, by which time the Board will have spent £27 mill. on capital account. During this period of 11 years from vesting date, the Board expects to provide out of revenue, by way of depreciation, some £10 mill. to £11 mill., and further finance will be provided from within the Board by the sale of assets no longer required as a result of integration, by accumulated revenue surpluses, and in various other ways. In all, by 1960, the Board will have provided the funds, mainly out of revenue, to meet about half the whole cost of bringing its undertakings completely up to modern standards. All the same, the Board will have doubled the written down value of fixed assets, which at vesting date was £13 mill., and it is necessary to examine what the Board will have gained from this large expenditure. Very briefly, the following are the main benefits expected:—

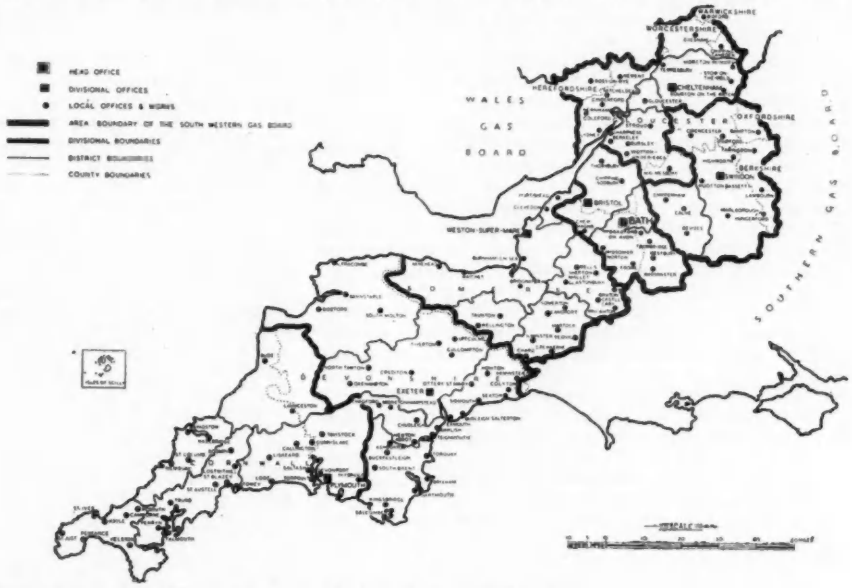

Fig. 6.—Administrative areas of the South Western Gas Board following reorganisation in April, 1954.

(1) *Age of Gas-making Plant*

(*a*) The average age of the Board's coal gas plant will be 20 years, as compared with 22 years in 1949, and in most respects the plant in 1961 will be more efficient than it has probably been at any time in the South West.

(*b*) Because of the large increase in water gas plant during the war, it will not be necessary for the Board to replace this type of plant at the same rate as coal gas plant. Nevertheless, as a result of extensions and the replacement of small plants by large units, the plant as a whole will be modern and of high efficiency in 1961, in spite of the gradual increase in the average age over the years.

(2) *Efficiency of Plant*

(*a*) While providing a proper margin for future development, the ratio of daily capacity of coal gas plant to annual make will have improved considerably by 1961, thus justifying the theory that integration of works and base-load working reduces the amount of reserve capacity of coal gas plant and, therefore, the amount of capital employed.

(*b*) The average terms made per ton of coal will have

increased from 70.3 in 1949-50 to 74.9 in 1959-60, an improvement of 4.6 therms or 6.5% over 11 years.

(c) In addition to the improvement in the therms per ton recorded above, it is anticipated that the coke and breeze available for sale or for water gas manufacture will increase from 9.6 cwt. per ton in 1949-50 to 10.1 cwt. per ton in 1959-60, an improvement of 0.5 cwt. per ton or 5.2%.

No estimates are at present available for the anticipated savings in works man-power over the coming years to 1960, but with only about 16 works then in operation, against the present 82, and these works highly mechanised, the savings in man-power should be considerable. The possible use of other new processes is always kept clearly before the Board, and may modify certain of these figures.

(3) *Mains*

By 1960, the total length of mains will have increased by about 1,400 miles since vesting date, and the total for the area will then be about 5,800 miles. These figures include, of course, both high- and low-pressure distribution mains.

Gas Consumers

It is anticipated that by 1960-61 the 1952-53 number of consumers (637,000) will have increased to 678,000 (at July, 1953, prices). These figures are conservative and do not take account of

(i) the fact that the tendency in the past has been for the population in the South West to increase faster than that of the rest of the country: and

(ii) any possibility of parts of the Board's area receiving a large over-spill of population from London.

The estimates do, however, take into account, on the one hand, the possible trend of new housing, and, on the other, that slum clearance and re-housing in the future cannot be expected greatly to increase the number of consumers. The modern tendency to house agricultural workers in groups in existing villages, rather than on the farms themselves, should tend to make the extension of mains to small villages a more profitable proposition than in the past.

The Board sees every reason to suppose that the downward trend in the consumption per consumer recorded since 1947 can be arrested and reversed to a modest extent by

(i) attractive promotional tariffs;

(ii) the energetic salesmanship of gas, in addition to the selling of appliances, now that the restrictions on advertising have been withdrawn;

(iii) the reduction of purchase tax and the exclusion of gas fires and other space heating appliances from the restrictive provisions of the Hire Purchase and Credit Sale Agreements (Control) Order, 1952; and

(iv) by meeting any demand the consumer may make completely irrespective of daily or seasonal loading.

In the case of the industrial load, the Board is even more optimistic, subject always, of course, to no major change in the general level of trade. The three main reasons for its views are:

(1) The trend in recent years has been for the industrial sales in the South West to increase at a greater rate than the domestic and commercial sales.

(2) There is still a very large untapped field for gas among the growing number of small industries. There is a modern tendency for light industry to open small factories in a number of towns where labour is available, rather than to erect large factories in one place with possible resulting labour difficulties. This tendency affords great scope for industrial sales of gas and also has the effect of increasing the domestic consumption in what had previously been considered to be rural communities.

(3) Particularly where female labour is employed, gas is generally preferred to oil owing to the better atmospheric conditions, and in small factories the certainty of supply is a major fact in favour of gas.

Of course, in assessing the future trend in sales of gas, proper weight must be given to the adverse factors as well, such as:

(1) Increased efficiency of new appliances.

(2) Further steady reduction in domestic lighting, particularly with the advent of television.

(3) Electrical competition in all fields, but particularly in space and water heating.

(4) The diminishing demand for gas for public lighting.

All these factors have been taken into account in the forecasts of gas sales.

Capital

It has been stated previously that, subject to any unforeseen event, the Board would expect to provide the finance to meet half the cost of the £27 mill. capital expenditure up to 1960, and by that date, although the interest charges will be falling from the peak a few years previously, they will still be in the region of 1.85d. per therm as compared with 1.02d. per therm in the first year of the Board's operation.

Income and Expenditure

Here, in particular, it is necessary to reiterate the caution that it is unwise to forecast the future, but a responsible body such as a gas board must have reasonably sure grounds for thinking that the expenditure of £27 mill. in 10 years is justified and can be paid for, and therefore it is necessary with all due caution to complete the picture by giving some estimate of the anticipated financial position in 1960. In order to do this, certain very important assumptions have to be made as follows:—

(1) That the level of trade will continue until 1960 at the same rate as during 1953.

(2) That the level of wages and prices generally will also continue at the same level as in 1953.

(3) That as a result of (1) and (2) above, the Board's tariffs need not be altered either upwards or downwards, but can continue as they were in 1953.

On the basis of these assumptions and on the estimates of capital expenditure, sales, etc., referred to above, and taking into account the reasonable expectation of the benefits to be derived from the Board's reorganisation, it is expected that in 1960-61, the Board will make a small overall profit of 0.41d. per therm, and probably this profit would be used to build up a reserve to meet future eventualities, or to wipe out any loss that might have occurred between 1952-53 and that date. Between 1938 and 1960-61 the average price of gas in the South West will have risen by 121%, and in the same period wage rates will have risen by 170%, the delivered price of coal by 241%, and the Board of Trade index of wholesale prices by 225%.

From these figures, it is fair to conclude that the price of gas has certainly not risen out of proportion to its main ingredients. This point of view should inspire confidence in the gas industry and in its long-term development. The reasons why it has been possible to achieve these results fall mainly into two classes:

(1) The very heavy cost of replacing and modernising plant has been offset to a considerable extent by the increase in the gas sold, 64% over 1938, and the increased efficiency of the new plant over the old.

(2) A better and cheaper organisation which, together with the increased level of sales, has resulted in only a comparatively small increase in the indices relating to distribution and consumer service costs, administration rates, etc. While a very large number of different factors contribute to the greater efficiency shown under these headings, it should in fairness be recorded that the Board's new and improved organisation referred to elsewhere in this paper is expected to make a very considerable contribution.

Methods of Gas Production

(*a*) *Manufacture*

Even a casual survey of the Technical Press during the past few years is sufficient to indicate that methods of gas production, which have changed little in their fundamentals during the past century or so, are likely to be altered considerably within the next decade or two. It may even be that, apart from some coke oven installations, we are nearing the end of conventional plant for coal gas manufacture.

A brief survey of the reasons for this may be of interest. With the concentration of production at a relatively small

number of base-load works, the horizontal retort plant is ruled out, largely on account of its labour requirements and the atmospheric pollution problems associated with it. The remaining plant, namely, continuous vertical retorts and intermittent vertical chambers, may hold the field for some time, but they may be affected seriously by the types and prices of coal available. The availability of the so-called 'gas coals' that the industry has accepted for years much as people accept sunrise and sunset, will come to an end relatively quickly unless some change is made in the price structure of coal and in fuel policy generally. There may be a change, though gradual, from a two-fuel to a gaseous fuel industry assisted by complete gasification and methane synthesis, while the effect of various products from the rapidly expanding oil industry cannot be ignored. In fact, liquid petroleum gas is already assisting in certain districts where integration is not an economic proposition at the present time.

The use of methane from coal mines is not likely to have an immediate effect upon the area of the South Western Gas Board, while the question of natural gas in this country is still an open question. However, the discovery of it in considerable amounts could have a profound effect upon the gas industry, and, to realise how great the effect could be, one has only to turn to the American gas industry where, at the end of 1951, natural gas was being distributed to 16 mill. consumers in 39 States and at distances as far as 2,500 miles from the source.

All this, of course, raises the important question of what has been somewhat loosely termed 'combustion characteristics,' and since the behaviour of gas in appliances is as important as calorific value, and is not likely to be subject to statutory control, it is a matter to which the gas industry should give increasing attention as one way of building up a satisfactory consumer service.

(*b*) *Purification*

The question of the operation of wet purification plant preceding the dry purifiers is very important because attention to that part of the purifying process can often improve the operation of the oxide boxes. Much existing 'dry' purification plant still has considerable life and, therefore, in such cases efforts must be made to improve the efficiency of the process because any profit from the sale of spent oxide may be more than offset by the labour charges incurred by unnecessary emptying and filling. In addition, the reaction of labour to the operation of dry boxes cannot be ignored, and, in that connection, the extension of tower purifiers and the 'dynamic' process can help, although there still remains the question of a satisfactory purifying material now that the supplies of suitable natural bog ore are becoming rather precarious. If the dry purification process is to be controlled closely, as it should be, it is necessary to have a purifying medium of constant quality and in a suitable physical state, and here a synthetic pelletted material, prepared from the by-product copperas of the titanium industry, may prove to be an economic proposition, as well as resulting in the sulphate radicle being made to do double duty: First to attack the titanium ore, and secondly, during the preparation of the purifying material for gas purifiers, to yield ammonium sulphate by reaction with ammoniacal liquor.

When using such constant-quality material, it may be economical to extract the sulphur by suitable solvents in ways already described in the literature, but, even so, the active life of the oxide is limited by the formation of cyanogen compounds; therefore, one turns, for these and other reasons such as ground space and labour, to liquid-purification methods, by which sulphur may be recovered in its valuable elemental form. The South Western Gas Board has shown a pioneering spirit in deciding to adopt such a process at three of its major works, and, in spite of the inevitable initial difficulties, the result should be very satisfactory.

(*c*) *Gas Quality*

The works throughout the area are now distributing gas of a standardised declared calorific value of 470 B.Th.U. per cu.ft., with the exception of three small units where liquid petroleum gas/air plants either have been or will shortly be installed. At vesting date the gas supplied by no fewer than 51 works in the area had no declared calorific value, and the final stage of standardising the calorific value was completed by July 1, 1953.

However, when the future of the industry is considered, there are other important matters that will have to receive attention before a satisfactory consumer service is provided, and obviously their attainment will cost money, while their value to the consumer and the industry will be difficult to assess, as was the case with naphthalene removal and partial drying. The points in mind are (*a*) removal of organic sulphur compounds, (*b*) prevention or removal of 'gum,' and (*c*) reasonably constant composition, apart from constant calorific value, so that more efficient appliance performance may be obtained. Perhaps the most pressing of these is the question of organic sulphur removal, which, as is well known, is technically possible, but is apparently avoided on grounds of cost.

(*d*) *By-products*

Coke

The future of coke is a subject around which considerable argument may develop, but it is likely that any changes in the major fuel structure of the gas industry will be slow rather than catastrophic. If this is so, certain factors are quite clear, and while a two-fuel industry remains it is essential to do all possible to maintain a high standard in all the aspects of coke quality, not only in the interests of consumers, but also to ensure a seller's market especially while coke has to subsidise the price of gas.

With the possibility of an increasing tendency towards a greater output of gaseous therms per ton of coal treated, the preparation of coke of suitable size and quality for standardised appliances will be of more importance. The opening of new works, commencing this year, will make available a large increase of well screened continuous vertical coke, while greater attention to coke handling will still further reduce breeze formation, although increased electrification at the works will release more breeze for sale.

The interest being taken, by both the Government and the general public, in atmospheric pollution, may result in the gas industry being enabled to make a greater contribution in the provision of more solid, smokeless fuel for domestic use. As stated earlier in this paper, it is more or less general practice to-day to install smokeless-fuel grates in new property. In the future, sales efforts will be directed still more to the installation of these grates in pre-war dwellings. The immediate future policy will be to give more publicity to the dual service, and in this connection more window space will be given to coke displays, while all salesmen will be trained in the sale of both gas and coke appliances.

Tar

The position of tar in the economic set-up of the gas industry is changing to some extent due to the impact of various products from the petroleum industry and the availability of petro-chemicals for which at one time coal tar was the main source. However, apart from creosote as a wood preservative and for hydrogenation, the use of prepared tar for road construction is very important, and the constant vigilance of the bodies concerned with it is welcomed.

Ammonia

This once valuable by-product would seem to have become a 'Cinderella' because, with the advent of synthetic ammonia, by-product ammonia processing has ceased to be profitable, but, viewed nationally, it is wrong to waste ammoniacal liquor, frequently at a cost to the gas-making process, unless it can be shown that every economically possible way of utilising it has been exhaustively examined. One way which may provide a partial solution of the problem is the use of crude ammoniacal liquor as a direct fertiliser, particularly for grassland. Apart from conserving valuable sulphuric acid, such a procedure would mitigate the difficult problem of stream and river pollution.

Storage

Mention is made of this matter because, apart from any desirable limitations imposed by the Town and Country Planning Act, there is the increasing difficulty

of finding suitable sites and also the necessity to limit wherever possible capital expenditure. The problem is being attacked by attempts to work with a smaller ratio of storage to output, and the modern use of boosters and remote-control systems is doing much to help. It may even be possible, if pressure gasification and purification processes are developed extensively, that some adaptation of American systems may be applicable such as storage in bottles at a pressure of 1 ton per sq. in., or, if suitable geological formations can be found, underground storage.

Education and Training

These matters, of such importance to the industry if we are to build for the future, have received much thought and attention and, of course, are emphasised by the obligation under Section 4 of the Gas Act, 1948.

The basis of the Board's education and training scheme is now being reconsidered. Progress has already been achieved, and many employees helped in their endeavours to gain qualifications to equip themselves for promotion. In many cases, day release has been granted, and course fees, examination costs and additional travelling expenses to and from the educational centres have been reimbursed to employees. But some modification of the scheme will be essential if the Board is to provide properly qualified men in the right places at the right times so that future demands of the area may be met. One of the principal difficulties has been the lack of educational facilities in the remoter districts, and means are being devised to overcome this obstacle as effectively as possible.

The education scheme of the Institution of Gas Engineers is well known to all concerned, and grouped course systems now operating prevent instruction from becoming too fragmentary. Now that there is a scheme, the main point is to see that it functions satisfactorily, and in that connection the Institution's District Education Committees provide an invaluable link between students and the Institution and do much to combat the feeling of remoteness that may arise in the minds of students who find themselves at a distance from the larger towns.

An increasing amount of attention is being given to certain aspects of education and training which have not hitherto been extensively exploited in the gas industry. An example of this is training for managers and supervisors which is so much stressed in American industry, and upon which a start has already been made in the South West.

Coupled with the education and training scheme must be the opportunity for advancement, and constant endeavours must be made to ensure that there are no dead-end occupations to restrict men of ability and energy from obtaining the experience and qualifications that will fit them for higher posts.

Research

An industry cannot be static, and, therefore, research is essential, but research effort must be co-ordinated since there is an increasing need, particularly at the present time, for putting into practice the knowledge already in our possession. As has been said elsewhere, the problem of making the results of research available, in a readily assimilable form, to those responsible for the construction and running of works is urgent, and there is a pressing need for a development organisation that would reduce the time period between the results of research and their application. The view has received attention, and, as the Chairman of the Gas Council reported recently, the Joint Consultative Committee on Research, established by the Gas Council and the Society of British Gas Industries, has continued to study the selection of subjects suitable for research on a co-operative basis. Both the Gas Council and the Area Boards support a number of research organisations whose work bears directly or indirectly on the Gas Industry.

Many of the subjects ripe for research have been dealt with elsewhere in this paper, while important papers dealing with such matters have been presented at the Institution's Autumn Research Meetings. A mere catalogue would serve no useful purpose; the chief points to consider are the approach to the question of research, the organisation of the research work, the availability of the results, and finally their practical application. In this connection, the observations on research in the United States of America as given in the Anglo-American Productivity Team's Report on the Gas Industry are not without significance. Without going into much detail, a few remarks on the subject of research may not be out of place. It may be that future research will be very much concerned with both complete gasification and methane synthesis, with a trend, as in the United States of America, to higher calorific value. Apart from other considerations, this would increase the thermal carrying capacity of existing distributing systems.

Meantime, the obvious work of increasing the efficiency of existing carbonising and ancillary processes must be pushed to the economic limit and procedures evolved for a partial swing-over to the processing of a wider range of coals than has been the case in the past.

Economic research must not be forgotten. It is vital to know the amount of gas used in various appliances both domestic and industrial, supplying the needs of different types of consumer. The work on appliances being carried out at Watson House is invaluable and in view of its importance to the industry and others, such as architects, planners and builders, will undoubtedly be extended. The gas industry will also have to give increas-

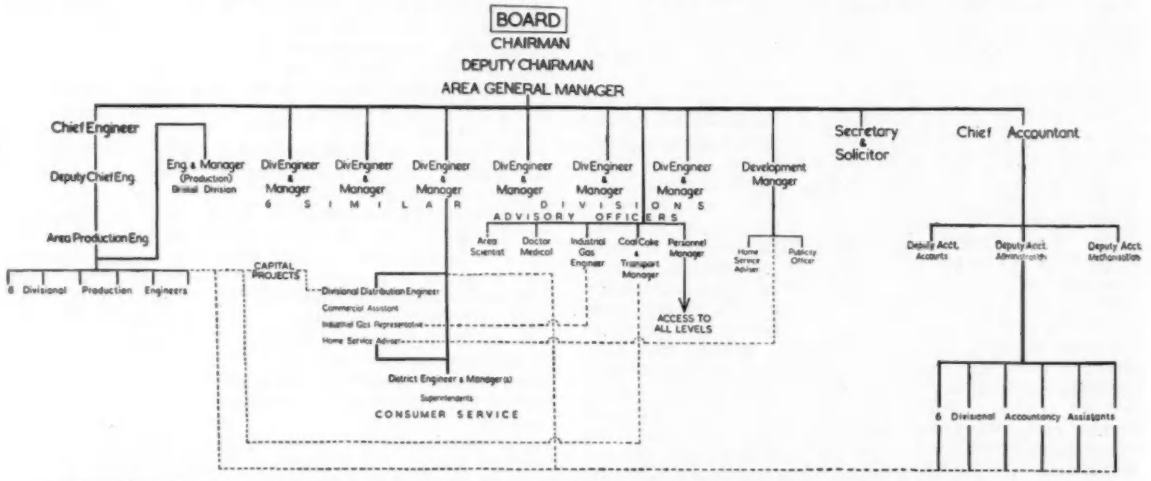

Fig. 7.—Chart showing operational committees following the new organisation of the Board as from April of this year.

ing attention to the variety of important facts usually grouped under the general heading of 'market research.'

DISCUSSION

Mr. **Henry F. H. Jones,** M.B.E. (Deputy Chairman, Gas Council) said that the author had given an account of the undertakings responsible for gas supply in the area before vesting date, he had explained how they had been built up into a single organisation, and he had set out also the Board's plans for the future.

The paper, continued Mr. Jones, included much material which was little concerned with engineering, but which was of great interest to the members of the Institution of Gas Engineers. The task of many engineers to-day, particularly gas engineers, extended far beyond the science and art of engineering.

When planning a works or a piece of gasworks plant, the engineer did not devote his attention to building the largest possible plant. On the contrary, he studied the requirements which had to be met, examined the technical and economic problems which had to be solved, and designed, as a solution, efficient and economic plant.

Engineering and finance had become closely related with problems of gas supply. The Board of which the author was Chairman, had an area which, being no less than 250 miles in length, presented exceptional physical difficulties from the point of view both of management and of technical planning. It was evident that financial control, both of revenue and capital expenditure, had been regarded as of the first importance, and several references to the planning of works, of distribution systems, and of gas storage installations showed with what care the expenditure of capital had been planned and controlled. Extravagance on revenue account, although most undesirable, could be corrected as a rule without serious consequences, but ill-judged expenditure on capital account could lead to a burden being placed upon gas consumers for very many years.

Much had been achieved in the South West by better scientific control, leading to improved technical efficiency and saving of money. But there was one aspect of the Board's plans—and, indeed, its present method of working—which would warrant even closer study. Reference had been made to the operation of plant and of works under 'base-load' conditions. Of recent years it had been fashionable to refer to the great economies which could be achieved by this means. These economies were not in doubt. They were substantial. All who knew technical results and working costs of a gasworks or coke oven plant operated at a regular daily throughput for years on end would realise his point. The picture was complete, however, only if the additional costs which were involved by reducing the load factor at other works or sections of plant were brought into account. In theory it must be right to give the best load factor to the plant which could give the best yield of products from each ton of coal, combined with the lowest operating costs for wages, repairs, and other items. In practice, other plants worked under peak-load conditions might operate at high cost owing to poor load factor and it might be found difficult to employ labour economically. In these plants high technical efficiency might be impossible to achieve and costs per therm made were likely to be high.

Without questioning the existence of the savings to be obtained by base-load working in the favoured works, one would like to see the overall economies of a group of interlinked works carefully studied under alternative conditions—first, with the most efficient works on base load, and, second, with each works taking its share of the fluctuations, subject to the requirements of repair programmes, and to the avoidance of operation of the oldest and most inefficient plant during off-peak periods.

Future Organisation

Many would find the section on future organisation of particular interest. It might be, as the author had stated, that the local engineer and manager had no longer a permanent place in the gas industry in the South West, but that the day of the specialist had arrived. This was inevitable, but men must gain all-round knowledge if they were to manage the divisions and departments of area gas boards. To ensure that they could become qualified for the management of these large divisions, groups, or departments, and could gain management experience, it would be necessary for specialist officers, such as engineers, scientists, accountants, and sales and service men to study the subject of management and to practise it.

It was sometimes thought that engineers and some other professional men, because they were specialists, were without experience of management. This was not usually true of men holding responsible positions. The works engineer controlled the employees on the works; the distribution engineer had his department to manage; on the sales and service side there were both the sales and the fitting staffs; while in the laboratory there were the scientific staff. In the accountant's office, there was the accounting staff. No doubt within the new organisation of the South Western Gas Board there would be sufficient staff with opportunities of gaining day-to-day experience of management in their various departments to enable their posts to be filled in the future when retirements began to take place.

Comment had been made in the paper on the possibility of the industry becoming more a one-fuel gas industry and less a two-fuel gas and coke industry. What would occur in the future must depend on the development of processes for the gasification of low-grade coal and of oil, and on how successful the Gas Council proved to be in its search for natural gas. The gas industry could not continue to be a two-fuel industry unless it could obtain adequate supplies of coal of a quality suitable for the production of good smokeless fuel by carbonisation and at a price which would enable that smokeless fuel to be sold on competitive terms. If supplies to the gas industry of this kind of coal continued to be as limited as they were at present, this would limit the extent to which the gas industry could enter the smokeless solid fuel market. Demands for gas which could not be satisfied by this limited tonnage of coal must be met in other ways. It could not be said that the total supplies of coal of good quality suitable for carbonisation were insufficient. Coal of this character was used in substantial quantities for industrial and domestic purposes.

At the Top of the Tree

Mr. **W. Bailey** (Gas Council) commented that on vesting date the author had been faced with the problem of knitting into one a large number of separate undertakings. In fact he had 76 undertakings all producing less than 500,000 cu.ft. of gas annually. At present there were something like 500 works producing just more than 3% of the total make. In the paper, information was given about the fixed assets employed per mill. cu.ft. sold. The figures for the South Western showed that at vesting date the amount was £548 per mill. cu.ft. of gas sold, whereas in the West Midlands the figure was £208. The author also gave the figures for the Southern and the North Western. He (the speaker) thought it was fair to say that in the case of the South Western Board the figures were well at the top of the tree. In other words, the South Western Board was having to bear a fairly high capital charge relating to compensation. Nevertheless, that capital charge was related to capital for 40 to 45 years fixed at 3%.

One question which had been in his mind for some time concerned the optimum size of a gasworks. All things being equal—delivery of coals, no distribution problems, and so forth—he would like to know what the author considered to be the optimum size of a gasworks.

Mr. Bailey suggested that capital expenditure was no more than trade revenue expenditure. It had to be paid for. Capital expenditure by itself was not bad; but capital should be wisely spent.

The problems which faced the South Western Board so far as organisation was concerned were no different from those which faced other large scale industries. He thought that the greatest problem was that concerning personnel—making the employees feel that they were part of a team.

Neither Shy nor Retiring

Mr. **E. Crowther,** C.B.E. (Chairman, North Eastern Gas Board), said that within the lifetime of some of them new phenomena had emerged in the commercial and industrial world. Trusts and combines had been formed; rationalisation of industry—both by vertical and horizontal integration—had been effected; the holding company movement had flourished and receded, and governments had gone into big business and, in some instances, had gone out of it again. Concurrently, checks and controls, anti-Trust laws, monopoly commissions, select committees, and the like, had been devised in an endeavour to secure that the benefits of these devices in the form of increased productivity and efficiency, and the fullest use of capital and material employed, should be equitably apportioned among the interested parties, owners, employees, and customers.

When, perhaps 100 years hence, the economic history of the twentieth century was written, it might be that the historian would find Mr. Chester's paper a valuable source of information on the problems entailed in one of the phenomena of 1954—the translation of a dispersed private enterprise utility service into coherent public ownership, and the development of means to solve those problems. It was necessary that such a record as this should have been made.

In an American newspaper he recently came across an editorial opinion that the heads of nationalised industries in Great Britain were shy or—mark the word, 'retiring.' Mr. Chester's paper was evidence that the author was not shy.

Nor was there reason to suppose that early retirement formed part of his plans.

On the technical side, the author had taken a characteristically bold course. He had made up his mind as nearly as possible to complete the modernisation of the manufacturing and distribution systems of the area of the South Western Gas Board within a decade of vesting date. Certainly no-one could pretend to be in as good a position as the author to judge the merits of this course of action, or to be able to weigh them against those of a more gradual attack.

There were, continued Mr. Crowther, certain small and isolated units, remote from any larger centre which, though operating at a loss, could not be improved financially by means of bulk supply. Hence one was tempted to wish either that nationalisation had been postponed for another year or two, by which time such undertakings would have disappeared and would not remain as a permanent financial millstone round their necks, or, alternatively, that nationalisation had come earlier so that integration could have been completed at capital costs one-third of their present amounts.

Looking at the financial picture in its broadest aspect, the author had pertinently emphasised that, in embarking on large capital expenditure, any responsible body must have sure grounds for thinking that it was justified.

The author had given an estimate of the income and expenditure position in 1960, stating the assumptions on which the estimate depended. Most unfortunately, the second of these —that the level of wages and prices generally would continue at 1953 levels—had already been falsified by events, and he (the speaker) feared that the recent increase in coal prices would prove to be the start of another turn of the inflationary spiral.

If the failure of this assumption led to a failure of the third—the assumption that gas tariffs could be maintained at 1953 levels—would it be possible to expand gas sales as was predicted by Mr. Chester, and as the financial success of the whole £27 mill. scheme required?

The price of gas had, as the author claimed, not risen out of proportion to its main ingredients. But was this the criterion which determined the consumer's behaviour, or was he not rather influenced by the relative price changes of gas on the one hand and of possible substitutes on the other hand? He would not pursue this line of thought further, except to say that a very heavy responsibility rested on the National Coal Board to hold the scales fairly between the gas industry and its other customers, a responsibility which not all of them were satisfied was being properly discharged.

Looking back at the past five years and forward to the next, as Mr. Chester had done, it was difficult to decide which was the more impressive—the volume of work already done by the gas industry since nationalisation, or the volume of work which remained to be done. In the case of the South Western Board they could congratulate Mr. Chester on the work done, and wish him success in what laid before him.

The Impersonal Note

Mr. **J. H. Dyde** (Deputy Chairman, Eastern Gas Board) said that it was obvious that the hurriedly evolved schemes instituted after vesting date for the welding-together of the many units comprising a Board into a single body working for a common purpose and to a uniform policy, would bring changes. It was difficult, invidious even, to make comparisons between one board and another, because of the many physical factors which could influence change in organisational structure. To these he would add the nature of the human material placed at a board's disposal by the impersonal act of nationalisation.

To his knowledge, however, there was a clearly discernible trend in the organisational changes that were taking place in the gas industry—and that was towards functional control. Mr. Chester had probably advanced further than most in this direction. In that connection might he quote from the Gas Industry's Productivity Report: 'Following nationalisation . . . . projects are proceeding for the concentration of manufacture and bulk transmission of gas over long distances than hitherto. With these developments in mind it seems obvious that the industry will follow the pattern to be found in the United States—namely, that of organisaion on a more functional basis. For reasons of efficiency and economy, greater centralisation of area operations, except those which give personal service to the consumer, is likely to follow.'

Might he also recall a paper presented to the Institution by Mr. C. H. Leach in June, 1948, entitled 'Functionalism as a Tool of Management.' It provoked a deal of discussion and controversy. It was assailed from almost every quarter. As far as the gas industry was concerned, it was in advance of traditional and conservative conceptions. It was worth re-reading in the light of things today.

Most gas boards, including his own, would agree with Mr. Chester when he said: 'The greatest opportunity for substantial economies lies in the closing down of uneconomic works and the supply in bulk from the pre-selected permanent manufacturing stations.' Mr. Chester's accrued and estimated future savings gave ample evidence in support of this statement. It was true that every increase in coal and labour affected in disproportionate measure the small and isolated works.

Achievement of this objective—*i.e.*, the pre-selection of works, the types of plant to use and the method of integrating supplies—presented individual problems to area boards. In offering comments on what Mr. Chester presented as his future plans, he (Mr. Dyde) was conscious that any criticism that arose might well be due to a lack of local knowledge so essential to the assessment of any problem.

Regarding the productive capacity to support the integrated supply system described, this showed to 1959 an appreciable increase in the proportion of carbonising plant, mostly of continuous verticals at the expense of replacing horizontals, and a relatively small increase in the total of carburetted water gas, oil gas, and producer gas. This latter capacity represented only 33% of the total installed capacity. He wondered whether Mr. Chester was apprehensive that the coal he needed for these carbonising extensions would be forthcoming, particularly of those qualities suitable for continuous verticals. It might be that he had in mind that the 'Rochdale' system would extend the range of suitable qualities for such purposes.

Again, was the selection and predominance of continuous verticals due to amenity conditions which precluded the employment of any other system? This would certainly be the answer as far as carbonising plant was concerned in the Eastern Board.

Was Mr. Chester satisfied that the characteristics of his load demand would be served by the low proportion of seasonal and peak load plant as indicated? It would be interesting to know how much oil gas plant was included in the author's forward plans to take advantage of any favourable changes in the economic position of gas production from heavy oil. Then, as to the method of integrating supplies, cast-iron pipes operating up to 30 lb. pressure have been selected, and there was an interesting provision in certain sections for relay pumping. Had the author considered the alternative use of steel—at any rate, for the main spine running North-East/South-West?

Cost of Distribution Network

Though higher in initial cost, steel pipe operating at pressures up to 300 lb. per sq. in. and having regard to the distances to be covered and the quantities to be transmitted, would seem to offer greater flexibility particularly with regard to possible future operations. Continuous cathodic protection would, it was confidently expected, extend the life of steel to the equivalent at least of cast-iron.

As to future operations, he could not divorce his mind from the thought that production would become more an inter-area or even a national problem. If this was so, then high-price coal areas, such as the South-Western and Eastern Boards, were likely to be affected. Base-load gas, from either coke ovens or high-pressure gasification plants, favourably placed in regard to their raw materials, might, with economic advantage, be brought into these areas. It would be an added advantage if the distribution system was sufficiently flexible to receive it. They had this in mind in regard to distribution developments in the Eastern area. He wondered whether any parallel existed as far as the South-Western area was concerned.

Mr. Dyde mentioned that in one of the divisions of the Eastern Gas Board, of 111,000 yards of linkage main that was laid, 71,000 yards was covered by wayleaves at a standard cost of 5s. per yard for easement in perpetuity. The actual amount saved per yard varied, naturally, with the size of main and class of road in which a main would have been laid; but with 12-in. main, for example, the net saving was. to a close approximation, £1 a yard.

Mr. Chester might be interested to know that the accounting developments of the Eastern Board were proceeding on parallel lines to those of his own Board, though they could not claim that they were yet so complete. This functional department was, however, providing more and more information to assist management within the other functional operations of the Board.

One could not but admire the bold venture of concentrating machine billing over so wide a geographical area at two centres only. It might well be that by its own more cautious approach to this matter the Eastern Gas Board was delaying economies

The Problem of Gas Pricing

Mr. **J. E. Wakeford,** M.B.E. (General Manager, Birmingham Division, West Midlands Gas Board), commented that, looking to the future Mr. Chester felt that the downward trend in consumption per consumer could be arrested and reversed to

(*Concluded on p. 804*)

The

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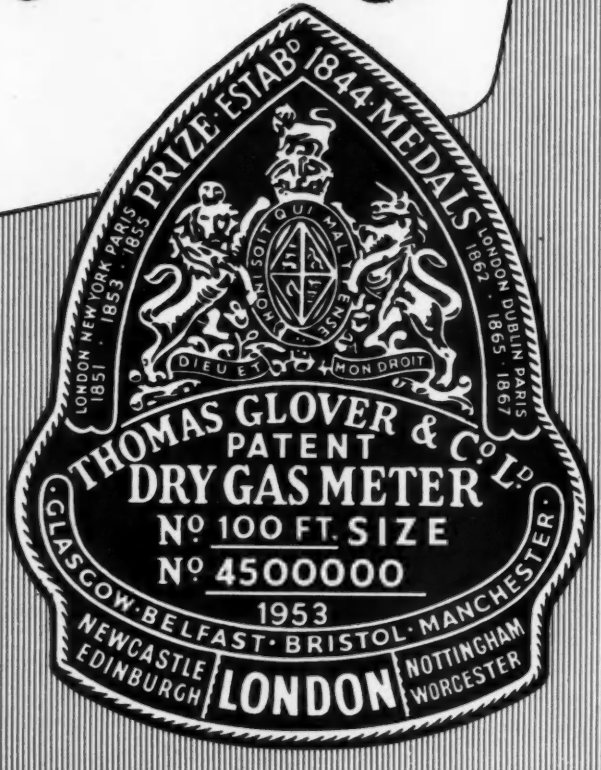
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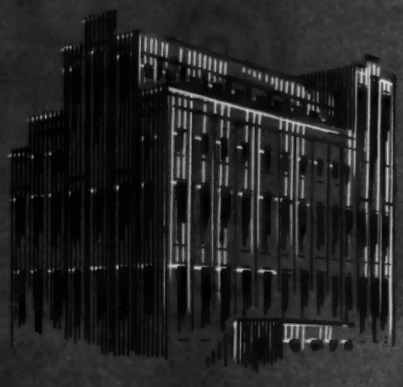

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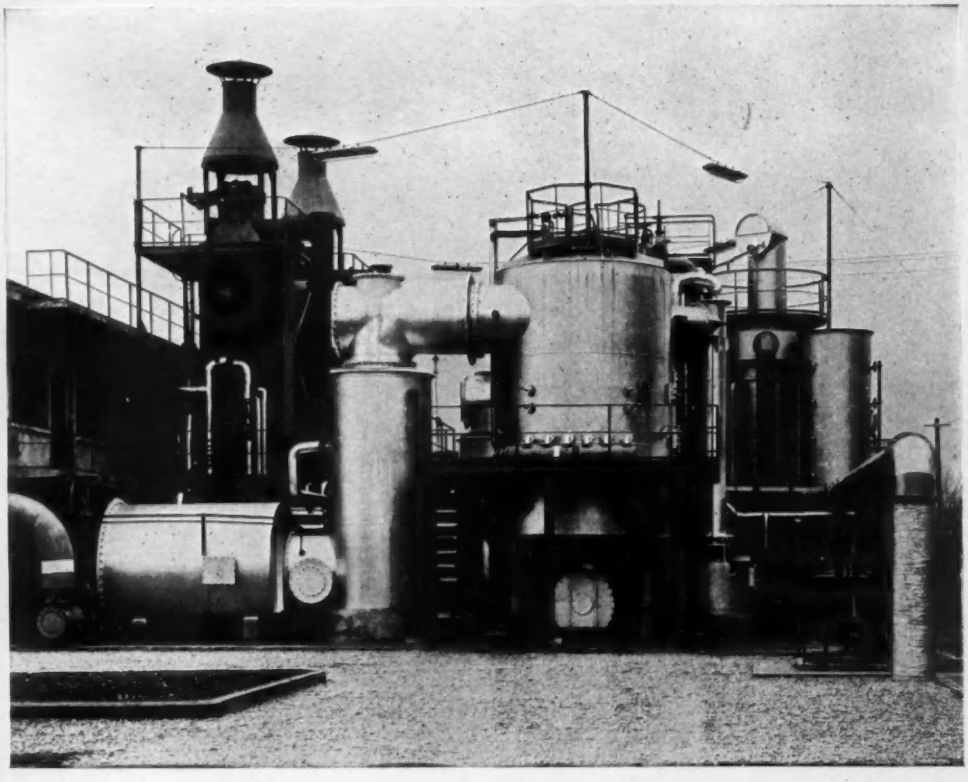

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CENTRALISED CONTROL OF A GAS GRID

FROM A PAPER TO THE INSTITUTION OF GAS ENGINEERS ON JUNE 1, 1954, BY

F. G. SYMON,

M.Inst.Gas E., A.M.I.Mech.E., General Manager, Central Division, Southern Gas Board.

Integration is not a new feature of the gas industry. Prior to nationalisation, there were in operation several grid schemes of distribution, notably in South and West Yorkshire, in the Liverpool district, and, of course, in the Greater London area. May, 1949, witnessed the sweeping away of legislative obstacles that had hampered interlinkage of gas supply; there was a 'burning' of artificial boundary fences. All this facilitated group working and the closing-down of uneconomic manufacturing units; and it rendered possible a much broader conception of distribution practice in general. Among the schemes to be considered and brought into operation after 1949 was that affecting the Central Division of the Southern Gas Board. It was clearly demonstrated that a scheme of the type that forms the basis of this paper would be economically justified by concentrating gas manufacture at a few efficient and relatively large works and closing down gradually the smaller uneconomic units. The scheme involved close study of the great strides that had taken place in gas distribution plant in general and in electrical control equipment in particular. This paper presents in some detail the outcome of research and investigation into this specific problem.

Immediately after vesting day, a careful survey was made of the manufacturing and distribution systems throughout the Central Division of the Southern Gas Board, after which a report was prepared and submitted to the Board. The report brought to light many disturbing factors among which were :—

(1) No railhead had been or could be provided at Midhurst, Haslemere, Farnham, Goring, Basingstoke, and Kingsclere, which resulted in high delivered coal prices.

(2) The gas-making plant on the smallest works was in poor condition. When considering schemes for improvement, it became evident that, apart from capital costs, it was impossible to obtain the essential renewals quickly enough to avert the danger of a breakdown in gas supplies.

(3) At one of the medium-sized units it had been the practice to reduce pressures for periods of three months in the winter time during the three years prior to vesting date. In this particular district, apart from increasing industrial demand, many new houses were being built.

(4) At another station, it was only with extreme difficulty that it was possible to meet gas supply commitments with the then existing works plant. The site was small and afforded no scope for additional gas manufacturing plant. It was found impossible to lay off retorts for repairs during the summer months, and the general condition of the retort bench was already causing disquiet and no new business could be contemplated.

Distribution and Manufacturing Plant

The worst feature on the distribution side was the dangerous condition of many of the steel mains carrying gas to 'out' stations in the Southern Group of the Central Division. These mains were much too small in diameter, were leaky (in one district unaccounted-for gas was over 18%; in another over 12%), up to half full of rust, and the necessary initial pressures at compressor outlets were ranging from 40 to 45 lb. per sq. in. The cost of running the compressor was 71s. 4d. per hour when handling 150,000 cu.ft. of gas at a pressure of 45 lb. per sq. in.

After careful consideration of the report, the Board sanctioned extensions to works at Aldershot, Camberley, and Reading, the laying down of a 'grid' throughout the Central Division, and the provision of a 14-in. dia. high-pressure main from Reading to Didcot to supplement the supply at Oxford.

The effective capacity of manufacturing plant at May 1, 1949, was 23.5 mill. cu.ft. of gas per day. The effective capacity of manufacturing plant completed or in course of erection is now 29.5 mill. cu.ft. per day. To present the size of the building programmes in proper perspective, it should be said that the gas manufacturing plant on the seven works now closed down accounted for a daily make of 3.77 mill. cu.ft. of gas. Following is a list of these works and the dates when they were closed down :—(1) Goring, October, 1949; (2) Haslemere, October, 1950; (3) Basingstoke, February, 1952; (4) Wallingford, February, 1952; (5) Midhurst, March, 1952; (6) Kingsclere, January, 1953; and (7) Farnham, April, 1953.

The Grid

Fig. 1 shows the high-pressure trunk and feeder mains at vesting day. Fig. 2 shows the mains as they are at midsummer, 1954.

The lengths of mains involved in laying down the grid were :—

Bulk Transmission Mains Laid Since Vesting Date	Miles
Northern Group	
Cholsey (Oxford) (14 in.)	13.0
Goring Branch (6 in.)	0.75
Reading—Wargrave (8 in.)	4.5
Reading—Theale, (12 in.)	5.5
Reading—Wokingham (12 in.)	6.0
Reading—Wokingham (14 in.)	1.0
Southern Group	
Sandhurst—Yateley (8 in.)	1.3
Camberley—Frimley (14 in.)	2.0
Camberley—Trunk Road Cove (12 in.)	3.25
Aldershot—Farnham (12 in.)	3.3
Farnham—Churt (12 in.)	6.3
Hindhead—Haslemere (8 in.)	2.0
Haslemere—Midhurst (8 in.)	4.0
Haslemere—Midhurst (6 in.)	4.0
Farnham—Basingstoke (12 in.)	14.7
Alton Branch (8 in.)	6.6
Bentley Branch (6 in.)	1.5
Basingstoke—Aldermaston (8 in.)	8.0
Kingsclere Branch (6 in.)	3.75
Total	91.45

The average costs per yard, which included reinstatement charges, were :—

	£ s. d.
14 in. main	4 16 0
12 in. „	4 0 0
10 in. „	3 15 0
8 in. „	2 5 0
6 in. „	1 15 0

The 14-in. dia. main to supply Oxford *via* Didcot was laid and brought into commission by the end of 1951.

When designing the grid and means of control, it was recognised that the operation of an integrated gas distribution system would be a comparatively simple matter if it were not for the incidence of peak loads.

The ideal arrangement would be for each district to be supplied from a gasholder having such a capacity that the input to the station could be regulated at a flat rate over 24 hours per day and it would not require any peak-load

topping-up from district governors of any type. Optimum load factors do not in fact exist, peak-load topping up from high-pressure trunk mains obtains almost universally and is not likely to disappear. Some districts, especially rural ones, are fed direct from bulk-supply mains, with the result that in some instances there is very little gas to spare for supplying holders during peak hours.

Fig. 1.—Diagrammatic map showing the disposition as at vesting day of the bulk transmission mains and the gas manufacturing stations in the Central Division.

Fig. 2.—Diagrammatic map showing the disposition as at midsummer, 1954, of the bulk transmission mains and gas manufacturing stations in the Central Division.

The handling of peak loads occurring on a bulk transmission system introduces a complication that affects both the distribution and production departments when steam is employed for compression. Peak demands for gas on the district usually coincide with the maximum demand for steam on the works, and it is not uncommon for a boiler to be kept under fire for 24 hours a day to handle a few peaks possibly totalling not more than 3 to 4 hours duration. From the cost angle it is, therefore, essential to aim at a reduction in the load supplied direct from the bulk-supply mains during peak hours, and to refrain, as far as possible, from taking on new loads of this kind.

The only way to flatten the peaks is to use storage capacity to the fullest limits, which in turn will tend to reduce pumping pressures and costs.

Ample storage is very rarely available, and as the capital cost of additional storage is very high it becomes imperative to use every available 'plate' in combating the peak load. It happens in too many instances that, due to the non-existence of a small booster, one cannot afford to allow a holder to uncup during peak load, as an inner lift rarely, if ever, throws sufficient pressure. Conditions such as these cut down tremendously the useful capacity of a holder.

If holders are not well down by the end of the day, the storage capacity that would otherwise be available for the production engineer for his night 'make' disappears. Furthermore, if all holders are full by midnight, it becomes impossible to keep the steam-raising and compressing plants running at an economic level.

If the holders are to be kept down during the daytime, more or less continuous supervision is required to prevent a failure of gas supply and at the same time ensure that full use is made of holder capacity.

It is obvious that the ideal arrangement is for the supervision of all holder stations to be located at a central point and in the hands of one operator, rather than to have holder attendants at each station working on a 'help yourself' basis. Orders were, therefore, placed for a system of remote supervision and control, the essential equipment being :

(1) Integration mains of suitable capacity.
(2) A gasholder at each station. This need not be of greater capacity than about one-third of a day's output; in fact, at one station the existing holder capacity is one-quarter of the maximum day's output, and no trouble at all was experienced during the abnormally cold spell in February, 1954.
(3) A booster at each station to ensure that 'uncupped' gas is available.
(4) A station governor to control the district pressure, particularly when the booster is working.
(5) A volumetric governor at each station to control the rate of feed into the holder.
(6) A central control room to which conditions of pressure, etc., at the holder station can be transmitted continuously.
(7) A means of transmitting the above information from holder station to control room.

By installing the necessary electrical equipment, the following facilities have been provided at the control room :—

(1) The indication of the pressure at the inlet to the volumetric governor. (High-pressure main.)
(2) Indication of the rate of flow through the volumetric governor. (Input to station.)
(3) Remote control of the volumetric governor.
(4) Indication of holder stock, with audible and visible alarms for high and low levels.
(5) Indication of the district pressure.
(6) Remote control of the booster, and indication whether 'running' or 'stopped.'
(7) Indication and alarm for low pressure at the inlets to volumetric governors.
(8) Indication and alarm for failure of electricity supply to holder station.
(9) Equipment testing facility.
(10) Telephone communication.

The above equipment is operated by a 50-volt battery at each station over one pair of telephone lines rented from the General Post Office. The batteries are charged automatically from the electricity supply mains through a trickle charger.

In addition to the above, certain automatic features are provided at each holder station. These are :—

(1) The automatic starting and stopping of the booster when the holder uncups or cups.
(2) Stopping of the booster when the holder reaches a dangerously low level.
(3) The opening and closing of the volumetric governor according to stock in the holder.
(4) Automatic loading and unloading of the station governor in accordance with a schedule fixed to suit each district.

In addition, each station has been equipped with an integrating and recording flow meter. This gives a record of the rate of flow into the station (weekly chart) and, at the same time, acts as the station meter. It is realised that the quantity of gas thus recorded will not take into account any gas supplied through district governors from bulk-transmission mains. It will, however, bear a direct relation to the output, so that by making suitable allowance for gas supplied direct it should be possible to estimate the increase or decrease in consumption from day to day, compared with previous years.

The Central Division, by reason of the disposition of the main production centres, was divided into two groups. The integration system was based on the idea of two groups although a link between the groups has also been provided.

There are two control points, one at Aldershot and the other at Reading. Aldershot control covers gasholder stations at Farnborough, Fleet, Farnham, Weydon Hill, Alton, Bordon, Basingstoke, Haslemere and Midhurst. Reading control will eventually cover Wallingford, Goring, Henley, Wokingham, as well as Didcot in connection with the bulk supply to Oxford.

Remote Control and Supervision of Gasholder Stations

A senior member of staff acts as Controller and is responsible for the operation of the grid. Only one attendant is required per shift for supervision at the control room, with one man for relief duty. The shifts are from 6 a.m. to 2 p.m., and from 2 p.m. to 10 p.m. From 10 p.m. to 6 a.m., the control room is not manned. Any alarm that might occur during the 10 p.m. to 6 a.m. shift is dealt with by the works staff. This would only occur if a fault developed in the remote control equipment. The operatives who were employed at each of the holder stations on a three-shift-per-day system have been released for other duties.

Over 16 hours per day, the following hourly readings for each station are recorded in the control-room record :—

(1) Holder stock.
(2) Pressure at inlet to the volumetric governor.
(3) Rate of input.
(4) District pressure or pressures.

The control room record consists of a loose-leaf binder having separate pages for each station; each page covers a day's working. On the left of the page is the target diagram (Fig. 3). This is in the form of a graph giving a forecast of stock in the holder throughout the 24 hours and a line showing the rate of input required to cover the day's output from the station. New graphs are provided from time to time as the load varies. At 10 p.m., the volumetric governor is set at a rate calculated to fill the holder by 6 a.m. the following morning, and the 6 a.m. stock reading gives a clear indication whether the input has been correct. Normally, the input will be such that the holder will be practically full by 6 a.m., at which time the daily demand will have commenced. It is necessary to ensure that the input is not excessive, otherwise holders will be full too early, necessitating the shutting down of compressors.

The centre of the page is occupied by columns for the hourly readings as above. By comparing these readings hour by hour, the attendant is able to see whether he is following the holder stock curve on the diagram. If the figures show a material departure from the target, the attendant appeals to the Controller for instructions. He is not supposed to make a material alteration without reference to the Controller.

The right-hand side of the page is devoted to the daily log. Here the attendant notes all control operations he carries out and any occurrence that takes place either due to

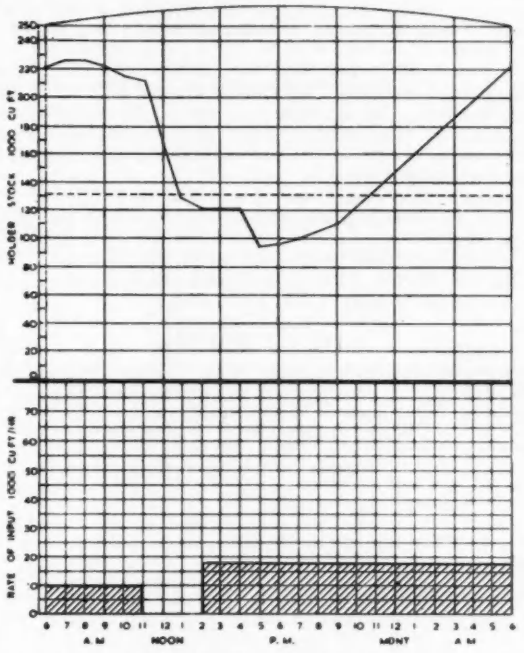


Fig. 3.—A typical target diagram for the control of gas stock.

automatic controls operating at the sub-station, such as a booster starting automatically, or any irregularities. The uncupping position of each holder is indicated on the target diagram, so that the attendant knows when to expect the booster to start automatically.

The position is reviewed each week by the Controller in the light of the figures obtained, and he modifies 'targets' accordingly. The Controller carries out the functions in conjunction with his normal duties, and is in close touch with both the distribution and production engineers.

The average cost of £7,000 for the complete remote control and supervision installation per gasholder station is made up from :—

	£
New building (when required)	2,500
Electrical gear, including panel, etc., at control centre	2,000
Booster, district governor volumetric control, etc.	2,500
	7,000
Charges :	
Interest and depreciation at 8%	560
Repairs and maintenance, hire of telephone lines, lighting, etc.	175
	735

When compared with wages paid to gasholder station and relief attendants, working three shifts per day, this figure of £735 represents a saving of more than 50%. Further savings have been effected in compression costs.

Whereas, at vesting date, compressors were housed at Farnham, they have now been transferred to Aldershot and supply all districts in the group and holder stations at Farnham, Weydon Hill, Alton, Bordon, Haslemere, Midhurst, Basingstoke, and Kingsclere.

By using gas-storage capacity efficiently, the actual peak-load is 145,000 cu.ft. per hour at a pressure of 10 lb. per

sq. in. and costing 10s. 4d. per hour. The off-peak load is 116,000 cu.ft. per hour for 20 hours of the day, at a pressure of 8 lb. per sq. in. and at a cost of 22s. 7d. per hour.

Without full use being made of stored gas at these stations, the total peak load would have been 261,000 cu.ft. per hour (including the loads directly fed from the high-pressure main), and the pressure required at compressor outlet would have been 17 lb. per sq. in. at a cost of 69s. 3d. per hour.

It will be appreciated that very considerable compression charges are involved if peak loads are not kept under strict control and if no attempt is made to spread bulk supply evenly over the 24 hours per day. By means of a well designed grid and efficient remote control equipment this can be achieved.

Another important factor that should be mentioned when discussing costs is gasholder capacity, for, although duplicate holders were beyond repair and eventually dismantled at Midhurst, Haslemere, Basingstoke, and Bordon, experience has proved that replacements are unnecessary, thus avoiding fairly high capital expenditure.

DISCUSSION

Dr. J. Burns (Chief Engineer, North Thames Gas Board) said there had been carried out in Mr. Symon's Division an extensive interlinking of manutacturing stations with the resultant shutting down of several small units of gas manufacturing plant. He would have liked to see some of the details of the economics of the scheme. There were many factors involved, the principal one of which was the cost of coal to any particular point, but they also included the cost of main laying, the cost of gas pumping, the cost of coke transport, and there was an economic limit at which it paid to interlink or to continue gas manufacture, even though on a very small scale. In the North Thames area they had carried out extensive calculations to determine whether it was, in fact, worth while to connect one manufacturing station with another, and he would have liked to see some similar calculations set out in the paper.

He noticed that the actual distribution of gas was controlled from two control points in the two separate grids, but only the distribution was controlled, and he wondered why the opportunity had not been taken of controlling manufacture as well. Probably the major benefit of inter-linking was the provision of the choice of plant to make gas under any set of conditions. There was perhaps a feeling that the control of gas manufacture from a central point took away responsibility from the manufacturing stations. He could even suggest the reverse was the case, for the man in charge of a manufacturing station could be given the opportunity at least twice a year of determining what his gas manufacturing schedule should be for the next six months, and it was then his responsibility, and a very real one, to maintain his plant to provide that schedule of gas on call at any time. Under such considerations, the gentleman who issued the call might be a very junior officer.

Remote Control

He could not speak with first-hand knowledge of the actual remote control and indications of the distribution system as the conditions in the North Thames area were very different. Remote indication of conditions was one thing but remote control of boosters, etc., was another, and he wondered whether remote control had really proved its worth. Automatic equipment for starting and stopping boosters, etc., at remote holder stations was now very reliable, and he would have thought a good deal more reliable than the remote control equipment brought back to the central control room.

He admired in this scheme the provision of the small booster attached to each individual holder or holder station to allow full utilisation of all the gas in the holder. The capital costs of the holder were now so high and, incidentally, the costs of a small booster so very low that it paid handsomely to be able to make use of all the gas in storage. In how many cases up and down the country did they find holders in which the gas in the top lift stayed there from one year's end to another?

If there was any spare money available, he would like to invest it in bigger sized mains to provide for the future and keep down pumping costs for the present. Selection of the proper size of main was a very difficult matter, and it was almost at the stage where one worked it out scientifically with a background of ponderous statistics, and when one had done all that one multiplied that by two for good measure. Above all, one should never divide by two! He had found the paper very interesting. One thing was probably very certain, that the inhabitants of the area served by the grid now got a much better service than ever before. If there were criticism about the scheme at all he would suggest that consideration be given to adding to the responsibility of the men on the spot by controlling the amount of gas to be manufactured at any time from the central control points.

Integration as Means of Cutting Losses

Mr. W. Hodkinson (Chief Technical and Planning Officer, North Western Gas Board) said the development of numerous physical integration schemes or gas grids had followed naturally from the opportunities offered to the gas engineer as a result of the Gas Act, 1948. Perhaps the most outstanding feature which quickly became evident to those responsible for the planning of integration schemes was a realisation that had they been given the opportunities of the Act 10 to 15 years previously, at the costs then ruling, the competitive position of the industry in many parts of the country would have been quite materially different today. Indeed, in many instances integration was now used as a means of cutting losses.

The opening paragraphs of the paper told a story all too typical of many sections of the industry as at May, 1949, and while the Gas Council's Chief Accountant and, indeed, their own accountants might suffer some disquiet at the capital sums spent by the industry since vesting date, he would assure them that it was as nothing compared with the disquiet suffered by their engineering colleagues who had the job of facing gas demands in the winter of 1949-50 with the assets which they so proudly depicted in pounds sterling in their opening accounts.

Too Many Buttons

It was important to watch closely over capital expenditure and in the same manner that too many holes from the punched card systems of their accountant friends could be expensive, so too could too many buttons on their automatic control systems. He had in mind one such system where he was amazed to see the controller press a button on his panel and solemnly swing round in his chair, thoughtfully fitted with a swivel, to watch the operation of a 12 in. motorised valve situated within 8 ft. of his comfortable position.

The author had avoided all such dangers, however, by completely selecting what appeared to be the minimum facilities consistent with adequate control, and he had taken care of the essential features of grid design by paying due regard to the efficient and economic operation of holder storage and the maintenance, so far as possible, of base load conditions on his distributing system. Turning to the details of the author's scheme, he would like to ask one or two questions. First, was measurement at the reception stations positive or did the system rely on the flow meters integral with the volumetric governors? Secondly, if the latter, what was the experience of accuracy and measurement? Thirdly, what arrangements had been provided for anti-freeze to holders at reception stations and what type of equipment was used? Fourthly, in arriving at the figure for depreciation what life had been placed on the automatic control equipment? Finally, why two control centres, as on paper it would appear that Aldershot offered an ideal control focal point for the control of the whole system.

Mr. T. C. Battersby (Divisional General Manager, Watford) said the author had given a variety of technical reasons for closing down a number of works, but had not indicated in any one instance that abandonment had been due to economic reasons. He had little doubt that integration was as urgent for these reasons as the technical difficulties encountered in maintaining an adequate supply of gas. The interlinking of distribution systems made the greatest use of available manufacturing plant and holder storage, but as the author had rightly stressed, in order to obtain the utmost advantage from such a system, it must be under close control, and he would compliment him on having incorporated such a complete system of remote control at the information centre, and on the various safety features which he had introduced at each holder station.

Reliance on Electricity Supply

Much would appear to depend on the continuity of the electricity supply. Very wisely, he thought, the author had arranged for the Post Office telephone lines to be energised by a 50-volt battery, but he wondered what provisions had been made to maintain district pressures in the event of an electric power failure while boosting. Except for the fact that this might be described as a Rolls Royce job (he had the privilege of seeing it and was somewhat surprised to find that he had not a television set for the operator to look at) he was rather surprised he had installed integrating and recording meters on each volumetric governor, because they were quite expensive items. There was a very good case for the abandonment of the local metering of gas except at manufacturing stations, and for fixing flow indicators on volumetric governors as necessary, to determine flow conditions. To ascertain the demand and growth in any district the meter rental returns should give sufficient information.

Small Holders Scrapped

The author had apparently thrown a number of small holders into disuse. It was a sound policy to scrap the small holders at abandoned manufacturing stations, and when it was necessary to increase the holder storage to avoid high initial pumping pressures during periods of peak demand, to site new holders as near as possible to the centres of major consumption. Small holders should, wherever possible, be avoided. They were expensive to maintain, and if relied on as an integral part of any system, ultimately their replacement must be envisaged, and they were relatively very expensive to erect. The author's control system was attractive and appeared essentially simple to operate. Only time would show whether or not maintenance of the remote control equipment was a vital factor. He would, however, have welcomed a clearer indication of the overall operating costs.

The facilities provided gave complete centralised control of distribution, with a minimum of personnel employed, and whether such a system was manually or automatically operated, experience had shown many of them what economies could be achieved by the introduction of close supervision.

He was sorry the author had not indicated the total available holder storage of the system relative to the maximum days demand, because when designing these systems such information was as important as local storage. During last winter, on an integrated system within the Watford Division, they satisfied the demands of a maximum day of 34¼ mill. cu.ft., with only 13.8 mill. cu.ft. of storage capacity, which represented approximately 9½ hours of the maximum day. This was admittedly rather low and would be increased to 12 hours by 1956, when the maximum day was estimated to be 41½ mill. cu.ft., and the bulk of that additional storage would be located at the centres of maximum consumption. With well sited district storage, production station storage could be reduced to fine limits. St. Albans works had a manufacturing capacity of 15 mill. cu.ft. per day, with only one holder of 2 mill. cu.ft. capacity on the site, and even when the works was expanded to 20 mill. cu.ft., it was not intended to make provision for more than 3 mill. cu.ft. storage, though prior to the limitations imposed at the local enquiry, they hoped to provide 4 mill. cu.ft. storage.

Planned Development

Members would envy the author the opportunity which planned development had given him to embrace the integration of his Division within one scheme, and it would be interesting to know the maximum demand it was designed to meet. In pre-vesting days many engineers had to be content with piece-meal development as absorption and amalgamation took place. In those days prior to the Town and Country Planning Act, it was difficult to forecast the ultimate demands of a distribution system, or even to plan ahead for more than a few years. Most schemes, therefore, had to be designed with considerable flexibility in an endeavour to provide for an indeterminable extent of development.

The author stated that the cost of compressing gas had been reduced, but this would appear to have been brought about mainly by the reduction of pressures due to larger mains. He had, to his surprise, perpetuated the use of steam for prime movers when the cost of his steam was 6s. 8d. per 1,000 lb., which he assumed included capital and maintenance charges. No doubt his choice could be justified by local conditions and perhaps he had omitted to show in this figure any credit for the exhaust steam, if that was used for process or other work. In the Watford Division even with high load factors the diesel engine or electric motor was a more economic form of drive, diesel costing in the region of 0.7d. per B.H.P. hour including capital and maintenance charges and electricity about 1.0d. per B.H.P. hour compared with 1.8d. per B.H.P. hour when costing steam at 6s. 8d. per 1,000 lb.

South Wales Experience

Mr. T. S. Ricketts (Manager, South Wales Grid) said that in the South Wales grid they had endeavoured not to allow the grid mains system to develop or deteriorate into an easy method of reinforcing the supply in the outlying districts of undertakings through whose area the grid mains passed. Nevertheless, they were conscious that there were many individual cases where it was sound economics to supply certain consumers direct from grid mains, but each application for that type of supply was individually considered before approval was given, and no indiscriminate or haphazard direct connections took place. They regarded the maintenance of a good load factor as essential to an efficient grid control.

It would appear from the paper that Mr. Symon, besides adjusting the rate of flow into holders at times of peak load, also increased the rate of compression into the grid. In systems such as the South Wales grid, which received substantial supplies of purified gas from coke ovens, that method was not always possible, since some coke ovens had little or no holder storage available from which to draw additional gas at peak hours. Hence a regular hourly rate of compression had to be adopted. One coke oven was supplying up to 12 mill. cu.ft. per day and compressing that volume into the grid with no holder at all. That position would be improved this year following the completion of a holder now under construction.

The volume of gas compressed into the Central Division grid of the Southern Gas Board on the maximum day, appeared to be a rather small proportion of the total demand since the manufacturing capacity in use and under erection was given as 29.5 mill. cu.ft. per day. If that was so there would probably be ample holder storage available at Aldershot from which to supply the compressing plant with additional supplies during peak hours.

For comparison purposes the present maximum daily demand in the South Wales grid was 61 mill. cu.ft. per day, and well over half was compressed into grid mains at a constant hourly rate, the remainder being received into holders from various production sources and distributed under low pressure without going into the grid mains system. Perhaps the author could supply similar figures for his grid.

Temporary Breakdowns

When a direct supply from a grid main was being considered it should also be borne in mind that the grid supply might under certain conditions from time to time be subject to interruption. This might be caused by a temporary and sudden breakdown of compressors—if electrically driven—or by a fracture of the grid main especially if there was mining subsidence and ground movement. The latter could become an increasing hazard as increased mileages of grid mains were laid across country. The effect of such an interruption of supply, no matter how temporary, might be serious and even dangerous. They had therefore endeavoured in South Wales to ensure that wherever possible an alternative compressing plant from another source within the grid area could automatically be brought into the line to feed the consumers concerned should the main source of supply temporarily fail. Indeed when the demand of certain industrial consumers supplied direct from grid mains reached the magnitude of 3 mill. cu.ft. or more per consumer per day, that course was essential. Incidentally, these larger loads were often 168 hours per week loads and thus assisted in maintaining a good load factor.

In his paper the author mentioned that all holder stations were to be fitted with remote control equipment, but he did not say whether there was a minimum size of station below which he considered it might not be economical to consider such equipment. Out of a total of more than 41 holder stations in the South Wales grid, they were coming to the conclusion that the smaller stations might be operated quite satisfactorily in most cases without an elaborate remote control system, and the minimum size of holder station to be equipped for remote control they had in mind were those having an input of about 500,000 to 750,000 cu.ft. per day. These smaller stations could probably be left unattended for most of the time provided they were volumetrically supplied from the grid main and had suitable holder limit valves installed. For larger stations there were undoubtedly economic advantages and certainly in those cases it was essential to install remote control equipment for the efficient working of the grid.

Two Main Objections

Mr. F. Bell (North Western Gas Board) said there was no doubt that the judicious use of centralised control could assist in reducing costs, especially when coupled with remote control of distributing plant. Although the largest remotely controlled holder station with which he personally had had experience put out some 1,400 mill. cu.ft. a year, he thought Mr. Symon would agree when he said he could not see any limits really to the size of the application, particularly where the pressure raising plant at the controlled station was of the centrifugal or booster type. In conversations he had found that the main objections to such schemes were ill founded suspicions on the subject of security and cost, and he was happy to read that Mr. Symon had given a timely assurance on the latter point.

Although in the Liverpool Group they had several stations controlled in that way, they had never had any reason to doubt the information in the control room, and although when they considered the security angle, it would be idle to say that G.P.O. lines had never failed, yet on the rare occasions when that had happened, they had known immediately and were able to put matters right.

To man a station 24 hours a day necessitated attendance there for 1,095 shifts per year, but holidays and the incidence of the six-shift week meant that to achieve 1,095 shifts they paid for 1,366 shifts and at 27s. 10d. a shift this worked out at £1,900 a year. To this must be added sick pay, national health, and so forth, bringing up the figure to £2,100 a year.

Offsetting that figure by the £400 a year repair and maintenance charges reduced it to £1,700 per annum. Taking the present value of £1 at 4% over 20 years, this represented a potential saving of £23,100. The cost of remote control for a two-holder two-booster distributing station was in the order of £7,500 and to spend £7,500 to achieve an economy of £23,100 surely must be a good investment.

The Perfect System

Mr. Aitken (Bryan Donkin Company, Ltd.) said it would generally be agreed that the perfect operation of a grid system would be to bulk supply all the district or group holder stations, accept any peak loads direct off the grid main, including villages on the route of the main, reinforcing tail ends of existing low pressure systems, and at the same time keeping base load conditions on the grid. The criterion of the economics of grid systems was pipe size and pumping costs. Having accepted the annual charges on the mains for all potential loads in the foreseeable future, the pumping cost was the principal item whereby the cost of the supply could be controlled. Base load or peak load really meant volume and pressure from the compressor.

The author had a controller who had absolute knowledge of all stocks, pressures, and flows in all his area of supply. The only vital fact he did not know was the amount of gas being supplied direct to consumers off the grid. If the controller had also the volume, pressure, and speed of the compressor at his disposal then he could control flows into holder stations, probably cutting the majority off altogether at peak load times, and keep absolute base load on compressors. The average volume would be slightly increased due to replacing holder stocks at off peak times, but stations with good holder stocks could be cut off for a longer period, enabling the stations with lower stocks to be fed.

It was an indication of the author's system that peak loads could be accepted with such a relatively small disturbance of base load conditions, and he suggested that peaks could be accommodated up to the figure for the average hourly bulk supply input. One of the controller's principal duties should be to keep a strict control of terminal pressure where 1 lb. would be sufficient for station operation, for the difference between 1 lb. and 2 lb. for a volume of 116,000 lb. was 3s. 6d. per hour. Attention to that point would just about pay the controller's wages.

The Target Diagram

Mr. Plumley (Application Engineer, Bristol's Instrument Co., Ltd.), noticed that the facilities which the author obtained at the control centre were all indication facilities, and he wondered whether that was because the instrument he used did not suit recording, or whether he looked into it and decided that recording was not necessary. He noted that Mr. Symon did expect his operator to record once per hour the holder stock and he would like to know whether a recorder would not be more suitable.

With regard to the Post Office line, they would all like to know more about how good the Post Office was in maintaining the service. After all, the whole of the system depended on the continuity of the Post Office line, and one could foresee that all sorts of troubles could develop if it were not good. He had heard of a water company which threw out the Post Office line and installed its own because it found that it was unreliable. He had also come across cases of reversed polarity. He also observed that the telephone circuit was included on the single line, and wondered whether that was a good thing. Would it not be better to keep it separate and hire a single line in the normal manner for each station?

With regard to the control room target diagram, the author had made out a strong case for automatic control of the system at the control room end. The next logical step would seem to be the introduction of programme control for holder stock. That would cut out the dependence of the system on the operator or the controller in following the target diagram.

The gas industry as a whole should consider the possibility of including more industrial instrumentation and automatic control. In industry generally automatic controls, mostly of the pneumatic type, had now been found to be reliable, and in the oil industry, for example, they were used throughout. He mentioned the oil industry because that was one of the chief competitors to the gas industry in price, and it might pay the gas industry as a whole to investigate the possibility of including more automatic control on the production and distribution sides in company with members of the instrument industry. The instrument industry did not appreciate the gas engineers' problems and the gas engineer did not know what the instrument industry could do for him.

A Simple Problem

Mr. L. J. Clark (North Thames Gas Board) said the designing and planning of any transmission and distribution system offered one of those rather simpler technical and economic problems which could be solved without making too many assumptions and without going too far into higher mathematics. Mr. Symon's paper was an example of one of those exercises and was of great interest for that reason. As other speakers had said, he thought he might have taken them further back in the study and started with the comparative cost of gas manufactured at different stations and from that point taken them on to basic calculations of the economic size of mains and pumping stations. As the size of the main increased so its cost rose and pumping decreased. They could plot the overall cost of plant against size of the main and it gave a U-shaped curve with high cost on the one side due to a preponderance of main charges and on the other side due to a preponderance of pumping charges. Looking at the author's figures he had the impression that he had started in the trough of the curve and at the end where the curve was beginning to rise again due to higher pumping costs, and he felt that as his load rose in the future, pumping costs would become rather excessive.

It would also seem from his calculations, from the quantities of gas to be pumped and the pressure involved that the pressure was higher than one would have expected for the size of the main and for the quantity. He would have expected pressures of about half those he had quoted, and he wondered whether he had been able to remove all the dust problems from the system to which he referred in the earlier part of the paper.

One of the basic operational features of the pumping system was to do the least amount of work on the gas to get it from point A to point B, and one of the most important factors in doing that was to maintain a high load factor on the mains. In order to achieve that the author had gone to considerable trouble in his control system.

North Thames Control Room

In the North Thames Gas Board they had a control room, but at the present time they did not control remotely. The average stations were large and could probably justify continuous attendance. The attendants worked on a time basis and were always in touch with the control room recording stocks hourly. That system worked well and by way of illustration it could be stated that during one of the peak days last winter the send out from Beckton, which was the focal point of the North Thames group, was substantially steady. In fact the maximum hour was only 7½% higher in output than the average during the day; in the author's case it worked out at about 20%.

On the question of load factor he wished the author had told them more about how the load varied throughout the year, because that was one of the predominant features of loading on the trunk main system. With regard to operating to a daily diagram of stock, they would not find that the best way from the economic point of view because of the fall off in loads at week-ends, and in order to make the best use of production plant the tendency was to work the holder stocks down to the week to accommodate what would otherwise be a surplus at week-ends.

He was also rather surprised to see that steam was still being used as a primary means of driving the compressors. It would appear that the cost of diesel fuel was between a quarter and a third of that of steam, so far as Mr. Symon's figures were concerned. In any case, Mr. Symon indicated that the compressors operated at atmospheric exhaust which seemed in turn to indicate that exhaust steam was not used for the process. Why not use a condensing machine which would reduce consumption by 30 to 40%?

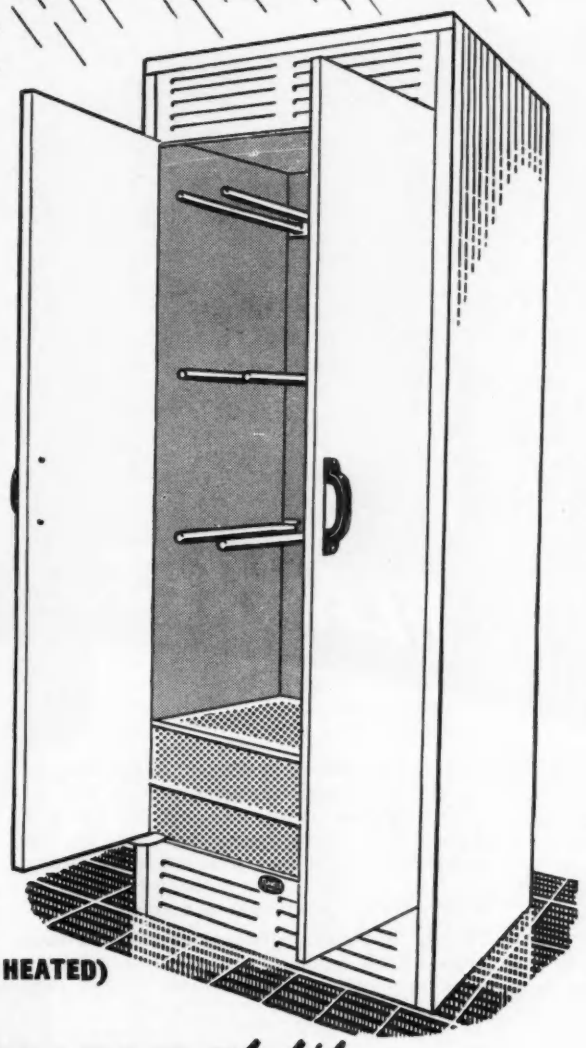
The Author's Reply

Mr. F. G. Symon, in a brief reply, said Dr. Burns had mentioned gas costs and said he thought it would have been an advantage if he had commenced the paper by dealing with gas costs. That might be so, but they proved that an integration system would be the way to deal with their problems in the Southern grid and, having proved that, they laid down the grid, and the paper was merely to show how they had controlled the grid. Mr. Hodkinson raised a good point when he said that many integration schemes were mainly to cut losses. They had met that problem in their own case. He knew of one small undertaking charging a very high price for gas on vesting day, but there were two stokers on each shift, a relief man for week-end work, a foreman, and the cost of transport bringing the coal to that station. When the costs were worked out it was found that gas was being made at about 13s. 6d. per 1,000 cu.ft. and being sold at 9s. 6d.

Mr. Hodkinson had also mentioned the question of measurement. He asked whether it was necessary to have a recorder and whether the vision dial of the volumetric governor would not do as well. The volumetric governor could give an indica-

Concluded on p. 808.

Are you in a "wet Monday" area?



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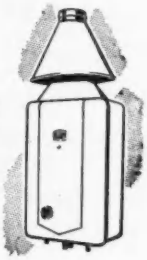

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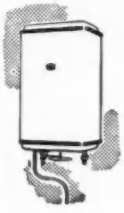

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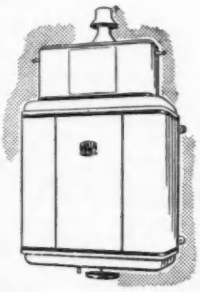

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The range has been designed on the unit principle, consequently wall or central pattern suites comprising any number of units can be supplied. Top bars, burners and oven fittings are easily removed for cleaning.

CONSTRUCTION

GENERAL—Angle iron chassis, cast-iron front frame, base members and door frame, sheet steel side, back and door panels. All taps are of the latest push-in safety pattern.

HOTPLATE—Cast-iron front and rear cornice, open-type top bars and drilled ring burners of various capacities. A grill section can be fitted if specified. The burners incorporate specially designed venturi for ensuring maximum flame stability at low gas rates. White enamelled crown plate or plates.

Model No.	Overall			Inside Oven			Hotplate	
	Width	Height	Depth	Width	Height	Depth	Width	Depth
	in.	in.	in.	in.	in.	in.	in.	in.
5127	27	36	31 1/4	21	20	24	27	30
5136	36	36	31 1/4	30	20	24	36	30

OVEN—Sheet steel with insulation 1" thick, fitted with two burners and front-reading Regulo control. Provided with tubular runners and three shelves. Door sealing is effected by means of flexible stain-resisting steel strips.

FINISH—Radar vitreous enamel with top bars and burners black vitreous-enamelled. White vitreous-enamelled door panel (or panels).

EXTRA—Potrack and white vitreous-enamelled backplate. Grill section on hotplate with grill tin and grid.

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NATURAL GAS AND THE ITALIAN GAS INDUSTRY

FROM A PAPER TO THE INSTITUTION OF GAS ENGINEERS ON JUNE 1, 1954, BY

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The first systematic development of the industrial utilisation of methane was at Polesine, about 20 years ago, when exploitation was begun of relatively superficial fields, at depths down to 2,000 ft., where the methane is found mostly in solution with brackish water. The gas was used for fuel. Often, in such cases, recovery of methane is complicated by the necessity to dispose of the brackish water without causing damage to the vegetation. In some places, the volume of water to be disposed of was equal to the volume of gas recovered.

In contrast to these earlier efforts, later exploitation has been of deep fields, and the Azienda Generale Italiana Petroli (A.G.I.P.), after 10 years of surveys using for the first time in Western Europe the seismic reflection technique, succeeded in giving considerable impetus to the development of such fields in the immediate post-war period. It may be said that industrial utilisation of methane followed immediately on exploitation of deep fields. Table 1 shows Italian consumption of methane in 1953 and its distribution between the different categories of use.

TABLE 1.—*Consumption of Methane in Italy during* 1953

Utilisation categories		Thou. mill. cu. ft.		Mill. therms
DOMESTIC				5.212	53.291
INDUSTRIAL—					
Extraction processes				0.238	2.437
Food industries				3.218	32.904
Textile industries				9.163	93.700
Paper industries				2.730	27.920
Metallurgical industries				13.634	139.415
Mechanical industries				6.504	66.501
Mineral processing industries				6.024	61.596
		10.512	107.494		
Chemical industries	Fuels	3.295	33.698		
	Synthesis	0.643	6.580		
	Degasolination	0.020	0.201		
	Bottled gas	14.470	147.973	14.470	147.973
Rubber industries				2.291	23.430
Electric power generation				9.342	95.530
Motor traction				5.830	59.619
Other uses				1.315	13.440
TOTAL				79.971	817.756

Use of methane in the Italian gas industry (apart from sporadic use of gas appliances by private persons living where natural gas emanation is a local phenomenon) has taken place in the following order:—

(A) Methane enrichment of manufactured gas.
(B) Re-forming of methane.
(C) Utilisation of air—methane mixtures.
(D) Supply of straight natural gas through existing distribution systems.
(E) Supply through newly-built natural gas distribution systems.

Before going into details, consideration should be given to the interchangeability of gases.

Interchangeability of Gases in Burners

Various formulæ and criteria have been proposed for assessing whether one gas is interchangeable with another. The Wobbe, Ott and Knoy indexes, as well as the different indexes proposed by the American Gas Association, have all, more or less, some limitations. In Italy, the method proposed by Gaz de France has been found particularly interesting, simple, and, so far as practical experience goes, quite reliable. This method shows the Wobbe Index and Delbourg's Combustion Potential by co-ordinates (preferably logarithmic). (Those who wish to examine this subject thoroughly should consult the work of Gaz de France.)

In this method, each kind of gas is represented by a point on the chart, depending upon the physical and chemical properties of the gas itself. For each kind of gas, a zone is charted that refers to that particular gas; gases whose characteristics correspond with the point included in this zone can substitute the first or 'base gas,' without any need to modify the appliances or their primary air adjustment.

The principles that establish the interchangeability of gases are rather severe. Nevertheless, experience shows an acceptable performance also for some points rather outside the prescribed zone. For instance, experience has shown that in one town all gas ranges adjusted for operating on a gas of 367 B.Th.U. per cu.ft. operated satisfactorily on an air-methane mixture of 495 B.Th.U. per cu.ft. whose characteristic point is near the mentioned zone, though outside it. On the other hand, the non-aerated flame burners had to be adjusted.

The simplest use of methane is by the addition of natural gas to town gas, which increases the calorific value of the latter. Methane may safely be added to town gas to give a calorific value of about 397 B.Th.U. per cu.ft. without modification of appliance adjustment made for the gas of 367 B.Th.U. per cu.ft. The Italian market for coke is at present rather weak, so that the gas industry can advantageously consider the enrichment of town gas with methane as well as the addition of methane to water gas or to producer gas, which would mean a reduction in the amount of coke for sale.

The re-forming of methane may be carried out either

(i) with steam (as at Milan, Verona, and Venice gasworks, to give a calorific value of about 320 B.Th.U. per cu.ft.; specific gravity, 0.35); or
(ii) with air (calorific value about 200 B.Th.U. per cu.ft.).

Since the re-formed gas has a very high hydrogen content, but a low calorific value, methane has always to be added. As to interchangeability and economy, it is advisable to add also flue gas to methane, or, in some cases, air, so as not to have a gas too rich in hydrogen. Should there be no coal gas, it is expedient to add air. Generally, Italian natural gas contains no sulphur; therefore, any pipe corrosion due to the presence of air is not significant.

By using re-formed methane, modified by the addition of methane and inerts (flue gas or air), it is always possible to obtain a gas that is interchangeable with the gas previously distributed—even if, in some cases, it has a slightly different calorific value. This method offers the great advantage (which is why it is preferred in the above-mentioned cases) that substitution is possible without altering the consumer's appliances. A main drawback of this method is that by re-forming the methane its therms are utilised with an efficiency which varies from case to case, and ranges, for the whole mixture thus obtained, from 60% to 90%, according to the processes adopted and the quality of the mixture.

This method is very interesting, but is generally likely in the long run, to be supplanted by straight natural gas, provided that large quantities of natural gas are available.

Use of Air-Methane Mixture

Mixtures of air and methane were first employed during the second world war, when the lack of carbonising coals, which Italy had to import from abroad, as well as irreparable damage to production plants, suggested emergency solutions, of which some are still in operation. A number of small gasworks, which, on economic grounds, could not have been self-supporting, also found it convenient to have recourse to air-methane mixtures after the war.

An air-methane mixture of 495 B.Th.U. per cu.ft. allows the distribution network to deliver a thermal value considerably higher than that given by a coal gas of 397 B.Th.U. per cu.ft. It could almost take the place of the latter on account of its combustion characteristics (except for use in non-aerated burners of water heaters and pilots, which must be changed or modified), and does not present certain economic disadvantages deriving from distribution of straight natural gas.

Defects and Advantages

The use of air-methane mixtures represents a treatment of supply problems intermediate between those previously mentioned and that of using straight natural gas. Like any other intermediate solution, it has defects as well as advantages. The principal advantages of using mixtures of air and methane are, first, that the thermal efficiency of an air-methane mixture is 100%; second, that when the methane pressure is sufficient, no power is required to prepare the mixture; and third, the greater efficiency of the distribution network, which can be illustrated as follows:—

The Wobbe Index (corrected) for an air-methane mixture, considering its approximate interchangeability for the 'base gas' previously distributed, is lower, on account of the presence of oxygen, compared with the Wobbe Index (uncorrected). Since the latter indicates the thermal supply capacity of an existing distribution network, it follows that this capacity is increased when using air-methane mixtures. So far as is known, about 10 Italian gasworks make use of air-methane mixtures to solve their distribution problems.

Generally, an air-methane gas is obtained by injection, which offers the advantages of constant calorific value and, at the same time, freedom from any hazard arising from interruption of the supply of natural gas. On the other hand, variable flow rates call for the use of several injectors; in this way, it is possible to obtain three flow stages by using two injectors, seven by using three injectors, and 15 by using four injectors. The methane pressure required at the injector is about 8.5 lb. per sq. in. (gauge) and the back pressure is about 12 in. W.G.

At present, the natural gas is in some cases supplied at a pressure insufficient to permit the use of injectors. In such cases, it is necessary to compress the air and to use safety devices to ensure the stopping of the compressor if the natural gas supply diminishes or if it fails completely. More elaborate automatic mixing devices having steady flow ratios may also be used.

If methane suppliers do not raise objections to high peak withdrawals, a single intermittent injector might be all that is necessary. Generally, air-methane mixtures replace coal gas in small works, but there are in Italy some gasworks of medium capacity (880,000 cu.ft. to 1.4 mill. cu.ft. per day) which last winter distributed a gas mixture composed of 68% of air-methane and 32% of coal gas, without complaint. There is no doubt, however, that in order to avoid variations in its quality, it is advisable to produce only one kind of gas. In spite of certain professional, preconceived notions of gas engineers, air-methane mixtures have given satisfaction, and to-day half-a-dozen gasworks operate exclusively on air-methane.

Supply of Straight Natural Gas

The most radical and rational solution for the use of natural gas—where it is possible to forego the production of coke, which puts at the consumer's disposal a considerable amount of heat under convenient and economically advantageous conditions—is to distribute natural gas only. There are some technical and economic difficulties. In particular, the increase of calorific value from 367 to 955 B.Th.U. per cu.ft. causes a reduction in the volume of gas sold in inverse ratio to the calorific value, though perhaps not in winter time, and gives rise to some problems:—

Incidence of Unaccounted-for Gas.—Methane has a viscosity lower than that of town gas, and an almost similar specific gravity, so that leakages are increased. Besides, for a similar quantity of heat sold, there results a large increase in 'unaccounted-for' gas, considered as a percentage of that purchased. Gasworks that register an unaccounted-for gas percentage of 10 to 12 might, on account of the combined effect of these two factors, register unaccounted-for gas from 30% to 35% of that distributed, assuming the amount of therms sold has not increased. In time, this situation tends to worsen if the jointing hemp becomes dry or if the rubber gaskets, swollen by the benzole always present in coal gas, shrink. To avoid further leakage, it is advisable to take suitable measures such as adding moisture and oil fog to the gas.

Meter Replacement.—As soon as conversion to natural gas is accomplished, there arises the need to replace many of the consumers' meters. These, when gas delivery is 60% lower than that formerly taken, often prove to be inaccurate and disclose measurement errors not previously detected. It is therefore necessary to test all meters, and to be prepared to replace a high percentage of them.

Conversion of Consumers' Appliances.—The noticeably different characteristics of coal gas and natural gas make it necessary to modify to some extent all the appliances used by consumers.

The conversion of appliances comprises:—

(i) Replacement of all injector nozzles. (This is necessary for all appliances.)

(ii) Increasing the burner port area. (When a certain decrease in the thermal output from the existing appliances is not prejudicial, this conversion is not necessary.)

(iii) Replacing all the gas jets of water heaters, of burner rows and of all devices where the gas is burnt without aeration; for example, in a water heater pilot burner, the change is made by fitting a tube to reduce the efflux velocity from the final orifice, or by narrowing the pilot tube and increasing the final port size.

(iv) Suitably modifying special appliances. In particular, it is to be noted that all devices whose designs disregard good technical standards to obtain a proper primary air injection on coal gas present some difficulties when converting them to natural gas, while burners properly proportioned for coal gas are more easily converted.

Difficulties Arising from the Necessity to Effect the Conversion within a Limited Time.—Since, as has already been said, consumers' appliances will not work if not properly converted, it is necessary when introducing the new gas to increase gradually the calorific value as well as to make repeated calls at consumers' homes to adjust their appliances, or to divide the distribution network into sections for block conversion in, one day if possible, in order not to inconvenience consumers by depriving them of the service for too long. Then there are street works to be carried out for sectionalising the distribution network. This presupposes that the network was fed before conversion from more than one place, or that an additional feeding system was provided for just this purpose.

Tariff Difficulties.—Under normal operating conditions, the management expenses of a gasworks are always preponderant as compared with the cost of raw material, but the majority of consumers do not realise this and expect from the conversion to methane a price advantage proportional to the reduced cost of raw materials. Moreover, consumers find great difficulty in appreciating that, on a reduced volume of gas sold, the proportion of management expenses rises so much as to reach an increase of even 170% in the case of conversion from 367 B.Th.U. per cu.ft. gas to natural gas.

It is evident that a reduction of management costs per therm sold can be obtained only by a great increase in the quantity of gas sold.

Avoidance of Tariff Difficulties by Increasing Loads.—An important load that might be increased with advantage is that for winter space heating. To obtain satisfactory development, it would, of course, be necessary to adopt convenient tariffs so that, even were gas heating more expensive than other kinds of space heating, the tariff adjustments would be such as to make it worth while for the consumer to continue his use of gas with its greater amenities. The prices at which natural gas is usually sold for heating purposes make it more acceptable than any other fuel, except oil, which, however, can be used only in central heating plants and not in single flats.

Since it is imperative that a gas undertaking should pay its way even during a mild winter, a higher price must be charged, in any block tariff scheme, for the first block

of consumption. On the other hand, even admitting that it might be possible to rely on a forecast of winter consumption, should a straight-line tariff be adopted the average price of gas would be too high for those consumers who would like to use it for heating purposes. There emerges, therefore, the necessity of fixing block rates. The first block corresponds, more or less approximately, to the average consumption of gas for cooking, and successive blocks apply to space heating and large industrial consumptions respectively. This block rate system offers also the psychological advantage of giving all consumers the certainty of being treated alike under the tariff scheme, because the average cost of the gas used depends only on the amount consumed.

From the technical point of view, it should be remarked that, at the time of conversion, the distribution network capacity offers a thermal distribution margin of about 165%, under the prevailing conditions.

In practice, it has been found that such a margin is not sufficient if the number of consumers using gas for heating purposes increases freely. There arises then the necessity of expanding the capacity of the existing network, which generally entails additional feeder mains. By installing at least one such feeder main beforehand, the problem of supplying the network from a point distant from the gasworks and sectionalising the town, is solved.

New Practical Results

The Lodi gasworks was the first in Italy to convert completely to natural gas. The town of Lodi, which was served before November, 1950, with a coal gas—producer gas mixture of 367 B.Th.U. per cu.ft., had about 5,000 consumers and three gasholders: two large (each of 70,000 cu.ft.) and the other small (21,000 cu.ft.).

The conversion of all consumers' appliances was made by dividing the town into 29 sections, and was accomplished in about 55 days. The cost of conversion was about 8,500,000 liras (about £5,000 at an exchange rate of 1,700 liras to the £), including the cost of appliance conversion and of sectionalising the town.

The conversion was made too late to see its effects in the first winter, but, during the summer, several feeders were laid in order to secure the large winter consumption. Winter consumption was still higher in the following winter and increased even more in the winter of 1953-54.

Before conversion of the network, the cost of gas in Lodi was 36d. per therm. After conversion, prices were lowered and governed by block tariffs. The average price from 1949 to 1953 declined progressively from about 17d. per therm to about 11d. per therm. These prices are inclusive of meter hire, and of the plant amortisation in 13 years only, and of a lease payment to the Municipality. Government and municipal taxes are excluded.

The number of consumers has increased from 4,887 in 1949 to 7,224 in 1953; and with tariffs more favourable to large consumptions, average consumption for each consumer has increased. Particular consumptions have increased in a few years almost in the ratio of 10:1.

The distribution of larger quantities of gas was secured by the following means:—

(i) New feeders and enlargement of the low-pressure pipe lines on the spot, this adding 2.17 miles altogether.

(ii) Eight high-pressure district governors, through which the gas is sent into the low-pressure network at 5 in. W.G.

The housings of these governors, generally made of iron, are provided with devices to moisten the gas and to safeguard against excessive pressure. The gas, which is sent out at low pressure from the gasworks and from the holder station is saturated with moisture at the holder.

The unaccounted-for gas, which was about 16% of the send-out, was reduced to 13% during the last financial year, with a remarkable increase in the net value. This unaccounted-for gas is due partly to real leakages, since methane, owing to its lower viscosity, tends to escape from joints in larger quantity than does coal gas, and still more when, as in this instance, the average pressure has been increased, partly to meter inaccuracies resulting from reduced deliveries in summer; and lastly, to the differences in temperature of the gas as purchased and sold. (Natural gas is purchased at 59°F. while in winter it is usually sold at a much lower average temperature.)

Conversion to straight natural gas in winter time, when space heating is the preponderant load, produced substantial variations in the send-out of gas per hour.

The proximity of natural gas fields made the utilisation of natural gas in Lodi much easier than at places distant from the source, but the results attained showed difficulties such as might be expected when converting to natural gas in larger towns.

After Lodi, two other towns, Fiorenzuola and Cremona, were converted by the company with which the author is associated. Other Italian gasworks, among which Brescia is the most important, had also converted to straight natural gas.

Some small centres, which were previously without gas, have been able to start a distribution service by exploiting closeness of relative proximity of methane pipelines. In such cases, of course, the distribution of straight natural gas was always adopted, because consumers would already have bought new appliances suitable for using natural gas.

For example, one might mention Monselice gasworks, where the plant is purposely designed to distribute automatically a small standby reserve of gas (14,200 cu.ft.) contained in a holder at 285 lb. per sq. in., should the natural gas supply fail. This plant proved excellent when, in 1951, flooding of the Po Valley interrupted the operation of the natural gas pipeline.

Daily gas deliveries being at that time small, it was possible to feed the standby holder by means of methane cylinders till the normal service was resumed.

For supplementing natural gas, it was also planned to provide a reserve of liquefied petroleum gas-air, which may, within certain limits, be interchangeable with natural gas.

Today about 50 straight natural gas distribution centres are operating in Italy.

Future of Methane Distribution

The foregoing experiences prove the practicability of using, on a very large scale, natural gas in the gas industry. In spite of this, it is very difficult, for the time being, to forecast the developments inherent in this important form of utilisation, owing to the fact that some very important policy decisions are still outstanding. The following considerations should be borne in mind:—

(*a*) The regulations to be adopted for distributing compressed natural gas to centres of population. Such decisions will have important consequences on the economics of gas distribution, and the problem is being studied by the competent Government authority.

(*b*) The regulations to be imposed by methane suppliers on their consumers as to withdrawal times, and maximum and seasonal peak hours in connection with total consumption.

(*c*) The occasional adoption of tariffs differing from the present ones, which are on a constant volumetric basis. This may have a decisive influence on future developments.

(*d*) A methane sales policy. This problem, which is being studied by the competent Government authority, deals with the preference to be given to industrial rather than to domestic consumers using gas for home heating purposes in winter time, since it is imperative that a natural gas pipeline should operate at a high annual load factor to realise optimum economy.

Notwithstanding these difficulties, it is thought that methane utilisation will, in the future, have a remarkable development in the gas industry.

DISCUSSION

Mr. **F. M. Birks**, C.B.E. (Deputy Chairman, North Thames Gas Board), recalled that in 1951 some of them had the opportunity of seeing the work on natural gas which was then in progress in the Valley of Po. He had been much impressed by the very interesting exhibition of the survey systems and geological models of the strata of the Valley which were demonstrated at the Research Station near Lodi. Afterwards they had visited a boring rig and inspected the distribution systems. The quality of design and workmanship of the plant were impressively high. It now gave him much pleasure to have the oppor-

tunity of discussing Dr. Böhm's paper, particularly as they in England hoped before long to be in the same fortunate position as their Italian friends.

Regarding the interchangeability of gases in burners, experience in Italy appeared to be very similar to what was found here, though of course not to the same degree. In England it had been found that the theoretical limits of non-aerated burners were sacrosanct and could not be exceeded, whereas the limits set for aerated burners were not so definite and could be exceeded without causing complaints from consumers. It was a subject that required careful study, which he hoped it would receive in the near future.

Unaccounted-for Gas

The author had stated that the natural gas from the Po Valley contained no sulphur, so that corrosion in pipes due to the presence of air in an air/methane mixture was not significant, but he also indicated that there were gasworks using a mixture of 32% of coal gas with an air/methane gas. Did he not anticipate serious trouble in both gasholders and mains in such circumstances? The references to the increased unaccounted-for gas were significant. With regard to the statement that the unaccounted-for gas was likely to worsen due to jointing hemp becoming dry and the shrinkage of rubber gaskets, perhaps the author would say if he had proof regarding that point, because some years ago he (Mr. Birks) had the experience of watching the effect of drying gas on a large scale while at the same time heavily extracting benzole, and there was no marked increase in unaccounted-for gas. Since the introduction of rubber gaskets in certain areas here it had been customary to use the lead tipped type. Was that customary in Italy?

All would congratulate the author on achieving such remarkable results as an average annual consumption per consumer of 385 therms, at the same time reducing the price from 36d. to 11d. They looked forward to the day when supplies of natural gas would be freely available in this country. From a rough calculation from the figures given it seemed that the average annual consumption at Lodi rose from 42 therms (which could be assumed as mainly cooking) to 385 therms. The difference of 343 therms might be taken approximately as the heating load, a most remarkable increase.

Wells as Holders?

The holder capacity, ample at the time when a relatively small quantity of coal gas was being distributed, would appear small now even allowing for the increase in capacity due to the much higher calorific value of the gas. Were governing arrangements such that the wells themselves acted as additional holders, or perhaps governors were unnecessary? If that was so, then the load factor on the distribution system became an hourly one and not daily, so that the difference in annual load factors of space heating and cooking might not be very much different. That meant, of course, that the cost of gas for cooking and for heating would be almost the same. Here, the speaker felt that the promotion of tariffs in such circumstances hardly seemed necessary, when a 100% increase per annum was enjoyed. Why did they wish to encourage the space heating load by suggesting a rather lower tariff than for cooking when cooking loads appeared to be so very small and in fact incapable of bearing additional cost to pay for a cheaper space heating load.

He thanked the author for a most interesting paper which so clearly showed the great benefits of natural gas, and expressed the hope that ere long a paper on the same subject might be contributed from this country.

Mr. **G. E. Currier** O.B.E. (Deputy Chairman, North Eastern Gas Board), thought this country was entitled to claim to have led the world in the development of new techniques in gas production and supply, for it was recorded that as early as 1659 a Mr. Shirley ignited natural gas issuing from a pond at Wigan. That and similar discoveries were not taken up commercially, for coal gas was produced and ultimately developed into the gas industry as they knew it today. Now the wheel had come full circle.

Dr. Böhm's resumé of the development of natural gas from its use in the enrichment of manufactured gas to its supply as straight natural gas was of great interest. Details of the costs involved in the use of the different gases and mixtures would greatly add to the value of the survey.

Gas or Air Compression?

It was interesting to note that natural gas was distributed as straight gas or as an air/methane mixture rather than as gas from reforming processes which only recovered some 60%, and occasionally 90% of the original thermal value of the methane. It was surprising to learn that in some cases, with air/methane mixtures, the pressure at which the natural gas was supplied was insufficient to permit the use of injectors, and that in these instances the air was compressed. Would it not be preferable to raise the pressure of the natural gas?

With distribution of natural gas only, the amount of leakage was considerably increased compared with gas of normal calorific value under the same conditions. Had Dr. Böhm found greater difficulty in detecting leakages? In this country unaccounted-for gas was of the order of 6 to 7%, but actual leakage was usually about 1%. At the same time the effects of using gas of about 1,000 B.Th.U. could seriously affect the unaccounted-for gas and the overall economics of the undertaking. The importance of having meters with a high standard of accuracy was obvious.

Great thought must have been given to the distribution network and to the meters in use before changing to natural gas, but the conversion of appliances was not difficult and usually not very costly. At Lodi it averaged only £1 per consumer. An Institution of Gas Engineers' Panel had given considerable thought and study to the specification for a pipe line suitable for transmitting gas at high pressures over long distances in this country. There, natural gas had been used to extend gas services to new areas of supply, which rather suggested that the customer in Northern Italy still retained his freedom of choice of fuel, and that gas was competitive with electricity. He would welcome some word on that point, having in mind the hydro-electricity schemes in Italy. At Lodi, which had been on straight natural gas since 1950, the increase in consumption per consumer was spectacular, of the order of 800%. It was difficult to assess the real economic effect of the distribution of natural gas, since the areas of supply quoted appeared generally to be virgin ground, where the possibility of consumer increase was relatively unlimited, with a very high potential load factor. Such conditions could rarely occur in this country where such natural gas as might become available would have to be used as an enriching agent or for reforming.

Management Expenses

The statement that management expenses were preponderant compared with the cost of raw materials was somewhat surprising. It was stated that management expenses rose to give an increase of 170% in the case of conversion from 367 B.Th.U. to natural gas; but surely the cost per therm was unaffected. The system of block rate charging was similar to that in general use in this country.

Dr. Böhm's concluding remarks with regard to a methane sales policy, and the need for a high annual load factor to realise optimum economy could not be overstressed. The post-war rise in the cost of capital plant and raw material had driven the industry to seek a cheaper means of providing gas services. The Gas Council made a bold and courageous decision when it voted £1 mill. for expenditure on a survey of the possible sources of natural gas in Great Britain. To date some gas had been found in Yorkshire, though this was discovered by a local authority drilling for water.

The exploration and development of gas deposits, the provision of mains and services, and the conversion of meters and appliances could be a costly venture, and the extent of the reserves of gas must influence the tariffs to be charged and the profitability of the scheme. It was understood that there was some difficulty in deciding the extent of deposits. That point would become of importance to an area board if gas were discovered in commercial quantities. The Lodi scheme had provided for that point by writing-off plant in 13 years. Gas engineers throughout Britain who were struggling to avoid increasing gas prices would note with envy that the Lodi tariff had fallen from 36d. to 11d. per therm despite the heavy amortisation charge.

Mr. **J. H. Dyde** (Deputy Chairman, Eastern Gas Board) remarked that until very recent years they had had to rely on the United States for information about natural gas, its prospecting, its conditioning ready for transportation or distribution and its direct use, and its use with or without reforming in admixture with manufactured gas. Now from France, Italy, Holland, Germany, Austria and also the Middle East and India, following discoveries of natural gas, came further information adding to the fund of knowledge which would be valuable against the discovery of any workable reserve in this country. He, Mr. Dyde, did not have an opportunity of visiting the Italian gas fields and his comments arose from information gleaned mostly in the United States.

Efficiency of Reforming

First of all, it was quite clear that the most efficient use of natural gas was as an enricher to manufactured gas or distributed 'straight' to the burner. Where it was necessary under any given set of conditions to resort to reforming it to produce mixtures interchangeable with gas previously distributed, then there was a loss of therms in the process. According to the various processes employed—and there appeared to be four main methods involved—the thermal efficiency of reforming as quoted by Dr. Böhm varied widely within the limits of 60 to 90%. That, of course, had a profound effect on the economics. They had had very great difficulty in getting accurate information in the United States on the efficiency of the reforming

process, and any information therefore which Dr. Böhm could give with regard to his plants at Verona, Venice and Milan would be most acceptable, particularly in regard to the question of the thermal balance.

The distribution of methane mixtures for small works was of interest. Mr. Dyde did not recall meeting this in the United States, though the use of propane/air and butane/air mixtures was fairly well established. It had also been developed in France and to some extent in this country. For methane/air the safe limits would appear to be much narrower, but apparently the injector mixing system (of which Dr. Böhm gave a drawing) had worked well and without incident in Italy. It was an interesting feature. It was noted that with sulphur-free gas the oxygen content was not feared from a corrosion standpoint; but he raised the same point as Mr. Birks and asked whether any precautions were taken to lower the dew-point or keep it low in such circumstances. Were the gasholders, for instance, oil-filmed, assuming that the natural gas/air mixture was dry or relatively dry in the first instance?

Planned Step-up of C.V.

There were a number of cases in the United States where the coming of natural gas led to a planned stepping-up of the calorific value of the gas distributed over quite a long period. That had been done, of course, in order to take advantage of the work-out of considerable existing capital resources in manufacturing plant. There was a particular instance in Chicago, which sent out gas at around 500 before natural gas was brought there. When the first pipe line was brought up from the South the C.V. was increased to 800; and in July, 1952, after a considerable period, it was again stepped-up to 900. There were now indications that by the summer of 1956 the C.V. would be raised to 1,000. Was parallel planning on those lines taking place in Italy?

The high incidence of unaccounted-for gas where natural gas was distributed through old systems containing hemp packed joints was well known in the United States and, as the author indicated, resort had been had to such expedients as rehydration and oil fogging, though more effective treatment was indicated to the Institution party in the form of spraying diethylene-glycol. This was claimed to have a lasting effect extending over some 15 years. On the other hand there were a number of companies which preferred to take permanent measures in connection with these open joints and to fit a variety of ingenious clamping devices.

Sales Policy and Control

Then came the question of sales policy. Many would feel that so valuable a national asset as a rich discovery of natural gas should have its use controlled in the national interest. The difficulty arose when one considered how such control should be made effective. Probably the consensus of opinion, following the lines of the Ridley Committee and other pronouncements, would be that such control should be exercised through the employment of carefully constructed tariffs which related charges to real costs. However, he (Mr. Dyde) did not think, in the case of natural gas, it was entirely the answer—unless one assumed that one could have restrictive tariffs as well as promotional tariffs. In the States there were two interested parties—first the pipe line companies who wanted to make the maximum profit; then the utilities which bought from the pipe line companies. The latter produced a system of charging on a two-part tariff basis which made the purchasing companies try to buy as much gas as they could all the year round.

What happened in the States—and presumably was happening in the same way in Italy—was a promotion of the space heating load which appeared to get out of hand. There were very high winter peaks and big summer valleys. There followed the logical sequence that supply companies wanted to fill in those valleys. What happened in the States was the well-known system of interruptible supplies and gas at almost ridiculous prices in order to bring down general overheads.

Mr. **L. T. Minchin** thought it interesting to remember the very long period of searching for natural gas and oil which took place in Italy. Borehole drilling started in 1927 or thereabouts, and it was not until 1943 that really large yields were obtained. The amount of money spent was very high indeed; but of course new methods of exploration might make things easier here.

On the question of methane/air distribution, it was usually held that the mixture was extremely difficult to burn. It caused a flabby flame which blew off into the air at the slightest provocation, and it would be interesting if the author could say what modifications were needed to appliances.

It was interesting to speculate what would happen if natural gas were found in Britain. He supposed a nation-wide rather than an area board distribution system would be required. A pipe line company seemed to him a most useful invention—a body with the pure and simple duty of distributing gas.

Mr. **D. B. Parkinson** (Eastern Gas Board) said he had for some time been connected with a small gas undertaking in the West Indies, which was now using natural gas. This gas became available a few years ago, and the exorbitant cost of coal delivered to the island made it very desirable to take advantage of it. It was decided after considering various alternatives to give an all natural gas supply. Dr. Böhm's paper was very interesting, as their experience in supply through an existing distribution system followed closely that set out in his paper. It had been very successful from the consumers' point of view and had created an ever-increasing demand; but the unaccounted-for gas had gone up alarmingly. They knew that the distribution system was not as sound as it should be and anticipated some increase in leakage, but not to the extent actually experienced.

The gas was brought direct to the works and also fed into the district mains en route as Dr. Böhm recommended. It would seem that the higher pressure at which it was necessary to distribute the gas, as well as the lower viscosity, contributed to the higher leakage. They had changed the consumers' meters throughout for new ones. Was it Dr. Böhm's experience that meters tended to pass unregistered gas when using small quantities of natural gas? Were dry meters used generally in Italy? It would be interesting to know in what form the moisture was added which the author said was desirable in addition to oil fog. Where the soil was corrosive, as it was in Barbados, was the Italian Gas Industry using plastic pipes with natural gas?

He was interested to see that air/gas mixtures were used in Italy. It had been strongly advised against in Barbados and they were afraid there might be some risk in it. That was before the days when butane/air was used over here, but even so the explosive limits were different. It would have saved them a good deal of worry, but the air round Barbados was particularly corrosive, and from that point of view he thought they were wise to go over to all natural gas. They spent some considerable time, while waiting for the necessary legislation, to change over the charge to a thermal basis on enriching the coal gas with natural gas, and they had gradually stepped up the C.V. which made the change-over somewhat easier.

L. to R.: Athol W. Brown (Aberdeen), E. G. Smith (Glasgow), H. V. Pye (Trowbridge), E. Annikin (Bath).

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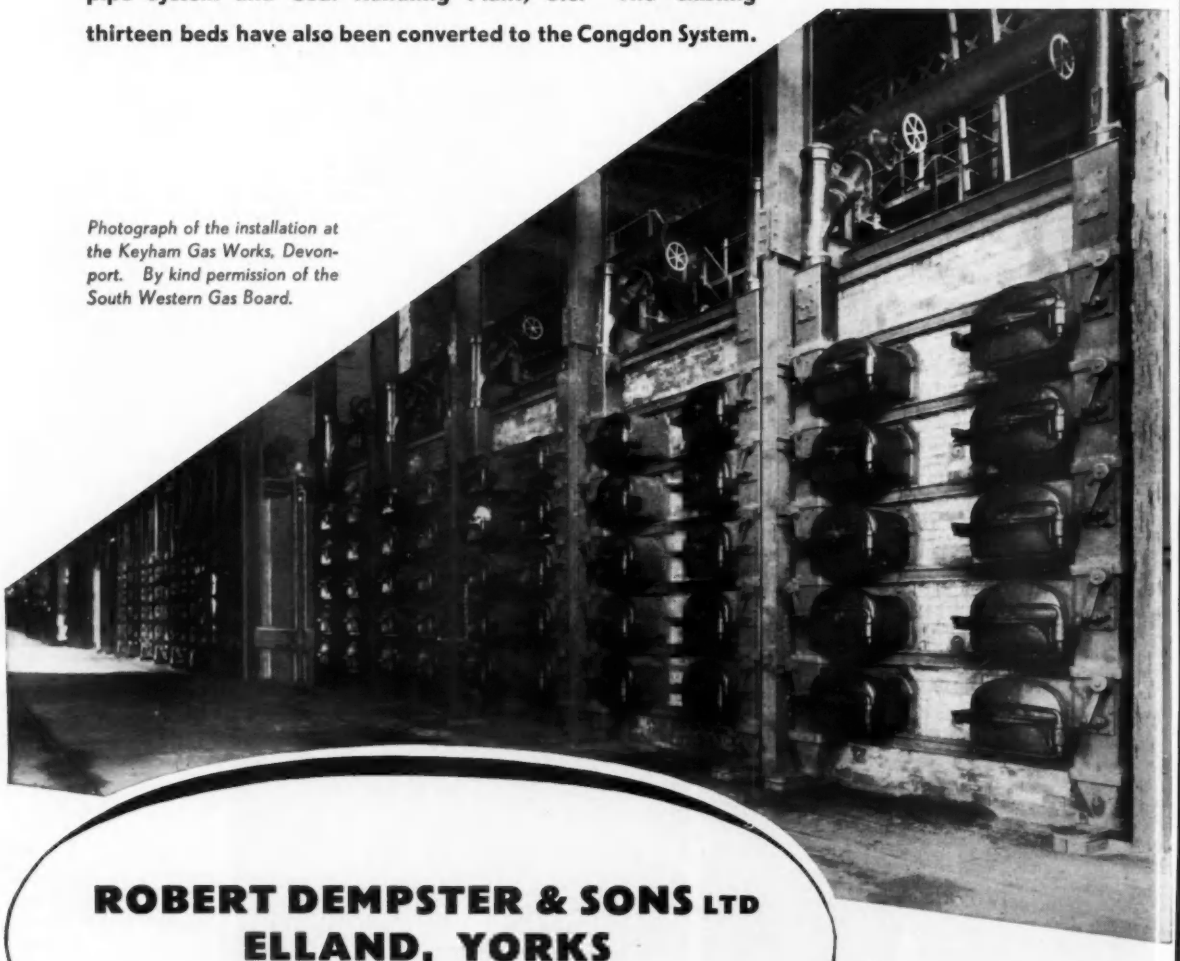

Photograph of the installation at the Keyham Gas Works, Devonport. By kind permission of the South Western Gas Board.

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HUMAN RELATIONS IN THE GAS INDUSTRY

PAPER PRESENTED AT THE 91ST ANNUAL GENERAL MEETING OF THE INSTITUTION OF GAS ENGINEERS, BOURNEMOUTH, JUNE 2, 1954, BY

HENRY LESSER,

C.B.E., LL.B., Immediate Past Chairman, Institute of Industrial Administration.

The author was formerly Service Secretary of the South Metropolitan Gas Company, and from vesting date until 1950 he was Adviser on Industrial Relations to the South Eastern Gas Board. In March, 1943, he presented a paper to the Southern Association of Gas Engineers and Managers on 'The Beveridge Report, with Special Reference to Pensions and Workmen's Compensation.'

The case for the study of the human factor in the gas industry was put very clearly and forcibly nearly half a century ago by that great gas engineer Sir George Livesey, to whose leadership and pioneering efforts the industry owes so much. In a paper read before the Southern District Association of Gas Engineers and Managers in November, 1907, this is what Livesey said:—

'We give great consideration to the purchase of coal both as to price and quality. Much less than 5% higher price or 5% inferior quality would bar any coal; and the same rule applies to the purchase of materials generally. Much machinery of various kinds is now used in gasworks, and the questions of efficiency and economy are the main considerations. But we have to do with another factor of a totally different kind, the human instrument, infinitely more important than any machine. We spend no end of time and thought on getting the best and most efficient machinery, and working it to the best effect: but what are we doing to develop efficiency in the men we employ? The animal part of the man, the simple machine, is used, but the infinitely more important parts—heart, brain and will—are neglected, and his intelligence not called into play as it might be.'

This was the problem to the solution of which gas engineers and managers were urged to give their attention some 50 years ago; and is it not in the same tradition that today in a world very different from that of Livesey's time, a new generation of gas engineers is invited to give consideration to the same theme? With much that the author has to say, therefore, the senior members of the Institution will not be unfamiliar; but it is rather to the younger members that these remarks are addressed, for it is on their shoulders that will mainly fall the responsibility of shaping and developing the pattern of human relations as the industry passes through the period of transition from the old to the new order.

Good Bag of Assets

It will be generally agreed that in the transfer to State ownership, the gas industry brought with it a 'pretty good bag of assets'—if one might vary an expression used by a former Chancellor of the Exchequer in connection with another nationalised industry—and not least among those assets was a notable record of happy relations with its employees.

It seems, therefore, that in planning the future it may not be unprofitable to look back along the road that has been travelled; to view the industrial situation as Livesey saw it and compare it with that of the present time. In a preface to his Paper, Sir George wrote:—

'The relations of capital and labour, as everyone knows, are in a very unsatisfactory condition, and, drifting as they are, can only become worse. The labourer, skilled and unskilled, is growing more and more discontented with his position. . . . The most pressing question for all employers is how to make these workmen contented and happy in their work, and, therefore, more efficient, to the general benefit of employers and employed. It must be done, if at all, on business lines; and so far as I have been able to see or learn, co-partnership is the only plan—in fact it holds the field.

These words, it should be noted, were written in 1907, many years after Livesey had launched his co-partnership scheme. In those days, almost every individual undertaking carried on its business as an independent unit, managing its own affairs in its own way. Neither employers nor trades unions were organised on the scale on which they are today—industry by industry—and the system of collective bargaining for terms and conditions of employment was virtually in its infancy. It was a generation, be it remembered, not very far removed from an age when, in Carlyle's caustic phrase: 'Man's whole duty to man consisted in giving him a few metal pieces and then shoving him out of doors.'

Before the Social Security Age

Social security schemes in this country were not even thought of. Employment was largely casual. If the worker was unemployed for any length of time there was nothing between him and the Poor Law, with its hated stigma of pauperism. Practically all the hazards of working life were taken at the worker's own risk. His physical and social well-being were things to which most employers scarcely gave serious heed; much less did they accept for it any moral responsibility. And rarely indeed was long service rewarded by anything that could properly be called a pension to mitigate the anxieties of the aged worker in his declining years. It is the memory of those times that so largely accounts for the mental attitude and restrictive practices of organised labour today; and it is in this context that Livesey's co-partnership must be judged. Whatever its critics may say now, there can be no doubt that the co-partnership system marked a formidable advance in the regard it gave to human values in the industrial relationship. For the moment, the point the author would make is this: he is not so much concerned with the merits and achievements of co-partnership any more than with its limitations and shortcomings. Rather is the word 'co-partnership' used as a form of expression to connote what was in effect a new industrial philosophy based on principles that are very much in tune with the progressive trend of modern thought.

The Claims of Labour

It may also be put this way:—Within the narrow limits of the business of an individual firm, the ideal objective of co-partnership was to satisfy, in the light of conditions then prevailing, what were understood to be the claims of labour. These claims may conveniently be grouped as follows:—

(1) Claims relating to pay; the demand for fair wages and for some share in the profits either in the shape of wage increases or other sharing process.

(2) Claims relating to other conditions of labour, such as security of employment, shorter hours and protection against onerous practices.

(3) A voice in the operation of the business so far as it affects employees, with the growing realisation that every activity, including technique, finance, and marketing does affect the employee.

It is an interesting comment that, while the status of labour has advanced immeasurably since Livesey's time, these claims are very much the same now as they were then. Indeed, in the nationalised industries today the administrative machinery as ordained by Parliament for regulating employment conditions seems designed to give effect to these aspirations. It is probably true to say that, among the former privately owned companies at all events, it was the impact of co-partnership in one form or another and the emergence of what came to be called the 'co-partnership spirit' that stimulated management—in con-

sultation with employees—to give practical expression to a more liberal, a more equitable and, may it not be said, a more ethical interpretation to the mutual interests of employers and employed than was currently recognised by industry generally. This need not be enlarged on. Gas engineers are no doubt familiar with the schemes of profit-sharing, the co-partnership bonus, the machinery of joint consultation through co-partnership and works committees, and arrangements for the decasualising of employment, health and safety measures under the supervision of the company's medical officer, the introduction of pensions, welfare and educational schemes, sickness and accident funds, accident prevention committees, the grant of holidays with pay, etc. These are an essential part of the theme of 'Human Relations.' And it must be admitted that the fruit of all this enlightened effort was reaped in the established loyalties, the product of confidence and goodwill, which brought to the gas industry so large a measure of stability, progress, and industrial harmony.

The somewhat general picture here drawn describes more particularly what were known as the company undertakings comprising about two-thirds of the industry, and even here, although the co-partnership pattern was fairly widely spread, it was by no means universal. There was, however, another important stream of influence and tradition flowing out of the local authority gas undertakings which were to be found mainly in the North of England, the Midlands and in Scotland. Here perhaps experiment in individual welfare and incentive arrangements had less place, and the outlook was rather governed by the fact of employment under public service conditions with ultimate responsibility to the ratepayer in the local council instead of to the shareholder, through a board of directors. Both the company and the local government types of organisation had their merits and demerits in relation to the human problems of production.

What the Worker Wants Today

The worker today demands a higher standard of life: better housing, clothing, amusements, more leisure. The educational advances made during the last few decades have not only given him a wider outlook, but have also made him more sensitive to social values. He takes a more active and influential part in politics and government. He has acquired a new sense of personal dignity and freedom. Successive Governments have recognised and are taking a greater interest in the personal lives of us all. We have arrived at the Welfare State with its policy of full employment; comprehensive schemes of social security providing for payments during incapacity for work through illness or accident, unemployment, retirement from work and during widowhood and old age—supplemented by family allowances and national assistance grants. The health services have been nationalised, and, with some minor modifications, are made available to every man, woman, and child without payment at the time of need. The cost of these and other extensive social services is extremely heavy, far exceeding anything that was contemplated when they were introduced. The burden falls—as it must—on industry, and the problem is how to get the human effort required to produce the means of paying for these concessions to human welfare. Hence it is that the key word in the lexicon of our national economy today is 'Productivity,' and unless productivity—that is, output per manhour—is increased, it is very unlikely, we are told, that the country will be able to afford the rising standard of life which everyone so much desires. This it is which is moving the minds of all industrialists today—and by industrialists are meant trade union leaders as well as employers—to a more intensive study of management practice and techniques which are concerned with human relations in industry.

Whole Structure Reconstituted

This then, very broadly, is the climate of opinion in which industry operates today. For the gas industry, however, it is not only that external conditions have changed to an extent almost revolutionary when compared with those prevailing in the early part of the present century; but the whole structure of the industry has been reconstituted in the passing from private and municipal to national ownership, and its place in the economic system of the country radically altered. Nearly 1,000 undertakings—company and municipal—have been taken over by the State and regrouped on a regional basis under the control of 12 area boards. This process has inevitably produced certain psychological reactions among a large number of employees. Their outlook generally and personal relations with management have been changed—whether for better or worse they are perhaps not yet quite sure; as is known, any abrupt departure from traditional ways or habits of thought has an important bearing on the mental attitudes of people to their work. Here then, as in other aspects of organisation, is a new set of values which demands in no small measure what might be described as a reorientation of managerial skills. No easy task, it is true, but in the light of what has already been written it is an effort which, it might be thought, will be rendered less difficult by the fact that there is available to management and employees alike—and may not the trade unions also be included?—an invaluable store of co-operative experience on which to draw in re-adapting existing procedures, already found fruitful, to the new needs.

The Human Aspect

In recent years the question of human relations has been very widely discussed. There has been something like a new awakening to its importance. Much study has been devoted to it by various management research groups, and new techniques have been evolved to suit special circumstances and types of organisation in different firms. The mixed teams of employers and trade unionists which visited the United States of America under the auspices of the Anglo-American Productivity Council gave particular attention to the subject; and in their reports have thrown much light on the differences between American methods and those practised in Great Britain. These reports reflect the different characters and traditional habits of the two peoples. There is indeed a vast literature on the subject ranging over a very wide field which might be profitably explored by those who are interested in the more detailed study of these management techniques. But, instructive as all this experimentation is, it is probably fair to say that so far at least as the author has been able to discern, much of it has already been tried out in one or other of the former undertakings of the gas industry. And if the gas industry's experience has taught it anything at all it is surely this: that whatever pattern of human relations may be devised, it will not work successfully unless it is conceived and accepted in the right spirit; and by that is meant a real sense of the duty which people who are banded together in the same industrial enterprise owe to one another, not only as fellow workers, but also as human beings. More than that, it must be motivated by such action on the part of management—at every level—as will evoke a sympathetic response in the mind and heart of every employee, so that he comes to feel that he 'belongs' to the organisation, holds a significant place in it—however humble—and is doing a worth while job. That, as the author sees it, is the heart of the matter.

The Urge to be Realistic

Now, as practical men, gas engineers may well ask: Is this not putting it too high? Human nature being what it is, must we not be more realistic? Is it reasonable to expect that ordinary men can rise to a standard of behaviour which is entirely free from self-interested motives engendering suspicion and distrust? To the author's mind, that is an approach which entirely misconceives the problem. It is not a question of any miraculous transformation of human nature, but of setting up a practical ideal towards which to strive. One has only to look at the industrial history of this country during the last 150 years or so to see that what was regarded as Utopian in one age has become the practical reality of the next. Let us by all means be 'realistic'—indeed, it would be foolish to be otherwise—but let us also remember that the common man has a great capacity for social living; likes to stand well with his fellow men; and under

skilled leadership, always provided basic conditions are right, can be as loyal and willing a team worker on the shop floor as he invariably is on the playing fields. The point to be made is that while to most people the main incentive to willing work is the pecuniary reward that it will bring, it is not necessarily to be assumed that man works exclusively for personal gain. On the contrary, it will probably be agreed that man is naturally active and likes to discover and apply power of body and mind to constructive work, partly for the sheer pleasure of doing things, and partly for the satisfaction of enjoying what he has done or made. Pride of achievement and the satisfaction of doing a job thoroughly and well—these and other incentives enter into industrial life besides the primary motive of profit or pay. And it is because of the belief in these qualities in the human character that progressive management today—with the sympathetic co-operation of responsible trade union leaders—is pursuing its quest for administrative procedures which it is hoped will stimulate employees to give of their best as willing and contented partners working for the better advancement of the business in whose efficiency they share a common interest.

These practical arrangements cover too wide a field to be discussed at any length in a paper intended to do no more than present a general survey of a problem whose many ramifications in most large undertakings today, are properly made the study and care of a separate department under the control of the specialist personnel manager. There is, for instance, an infinite variety of procedures involved in such matters as recruitment and placing of employees, their health, safety and welfare, training, job analysis and instruction, wage rates and grading, day-to-day business with trade union officials, joint consultative committees, and so forth. It is the function of the personnel manager to interpret the policy of his employers on each of these topics, and to advise and assist those of his colleagues who have executive responsibilities to give practical effect to them.

Typical Approach Procedures

Concerned, as the author is, therefore, with the broader aspects of the subject of human relations, it is proposed to deal only with three typical procedures which seem to be the main lines of approach to the problem, namely:

(1) The selection and placing of labour.
(2) Joint consultation.
(3) Communications.

It is not possible, of course, to deal exhaustively with these topics, but even a brief survey will, it is trusted, serve a useful purpose.

Some perhaps may recall the bad old days when men seeking work would come crowding at the gate. The foreman would pick the number he wanted, more or less at random, and start them at work, say, in the retort house or on some other unskilled labouring job. Whether or not they were the right people was settled by trial and error. Compare these happy-go-lucky methods with the streamlined technique of progressive employers today. The filling of vacancies is now generally regarded as a skilled job calling for sound judgment, tact, patience, and courtesy on the part of the 'employment officer.' Not only does he need to know a good deal about the nature of the work to be done, but must satisfy himself also as to the physical and mental fitness of the applicant, his personal history, experience, character, intelligence, and aptitudes generally. If need be, he will be assisted in that task by some competent person from the department where the candidate is to be employed.

The 'employment officer' will take care to explain and see that the applicant fully understands what he will be required to do, the conditions of employment, rate of pay, the average level of earnings, the hours of work, opportunities for special training, and like facilities, and the prospects that may be open to him for promotion. In this way the applicant receives a fair picture of the job at the time of the interview. The author can say from personal knowledge that considerate treatment of this kind is really appreciated by applicants for employment, and that these first impressions may go far to establish the reputation of the firm as good employers in the districts from which labour is recruited. This is a technique which has been highly developed in many undertakings having regard to the nature of the operations in which they are engaged. The author is anxious, however, not to enter too much into detail. It will suffice perhaps to add a word as to the practice of some firms after the man appointed actually starts work. He is given a brochure in convenient form setting out useful information relating to his employment, such as hours of work, rates of pay, holiday arrangements, pension and other benefit schemes, canteens, recreational and other amenities generally provided by the employer. The 'employment officer' makes regular contact with all new employees during the first few months of employment. An apparently casual word in passing can often provide a useful check on the way a new worker is settling in and draws attention to any problems of adjustment that may be occurring. The subsequent discussion with the man's foreman or supervisor helps to broaden the picture so that all the facts can be reviewed as a basis for possible action.

A useful by-product of this procedure is that it does encourage foremen and supervisors to keep a careful watch on their new workers and to think positively in terms of good human relations. Not only that, but the worker himself comes to realise that his employer is taking a sympathetic interest in him, and is more disposed to put his heart into his work.

Joint Consultation

Joint consultation is a thorny subject which calls for hard thinking, considerable patience and perseverance on the part of management. The experience of the gas industry over very many years affords abundant evidence of the satisfactory results that can be achieved by the frank and free interchange of views between management and employees. Among the former co-partnership companies the forum for discussion was either the co-partnership committee or works committee, and in some cases both. The chairman of the company usually presided at the central body, and the engineer or other senior official at local committees. These voluntary arrangements have now been superseded by the statutory mandate in section 57(1)(*b*) of the Gas Act, 1948, which lays on the Gas Council and each area board the obligation to consult with 'appropriate organisations' for the establishment and maintenance of machinery for the promotion and encouragement of measures affecting the safety, health and welfare of employees, and the discussion of other matters of mutual interest to them, including efficiency in the operation of the service. Thus, the trades unions are given a responsible part in the framing of these arrangements.

Before discussing the procedure by which this obligation has been implemented, it might help to clarify the matter if for a moment the basic principle of joint consultation is examined. The very word 'joint' suggests that there are different parties interested in the subject matter involved. In industry, these parties are usually two: management, which gives the orders, and the employees, who are to carry them out.

Management is mainly preoccupied with the shaping of policy and the arrangements for giving effect to it; the employees with matters incidental to the operations in which they are engaged, and the facilities provided for the proper discharge of their duties. Each party relies on the efficiency of the other. This is where their common interests meet. To adjust these interests in an atmosphere of mutual confidence is the purpose of joint consultation. And the question is: By what pattern of machinery can this object best be served?

Personal Contacts

In a small business with few employees, the problem presents little difficulty. Personal relationships and supervision are reasonably concentrated. Employer and employed can readily come to know and understand each other. But in a large corporation, where a great

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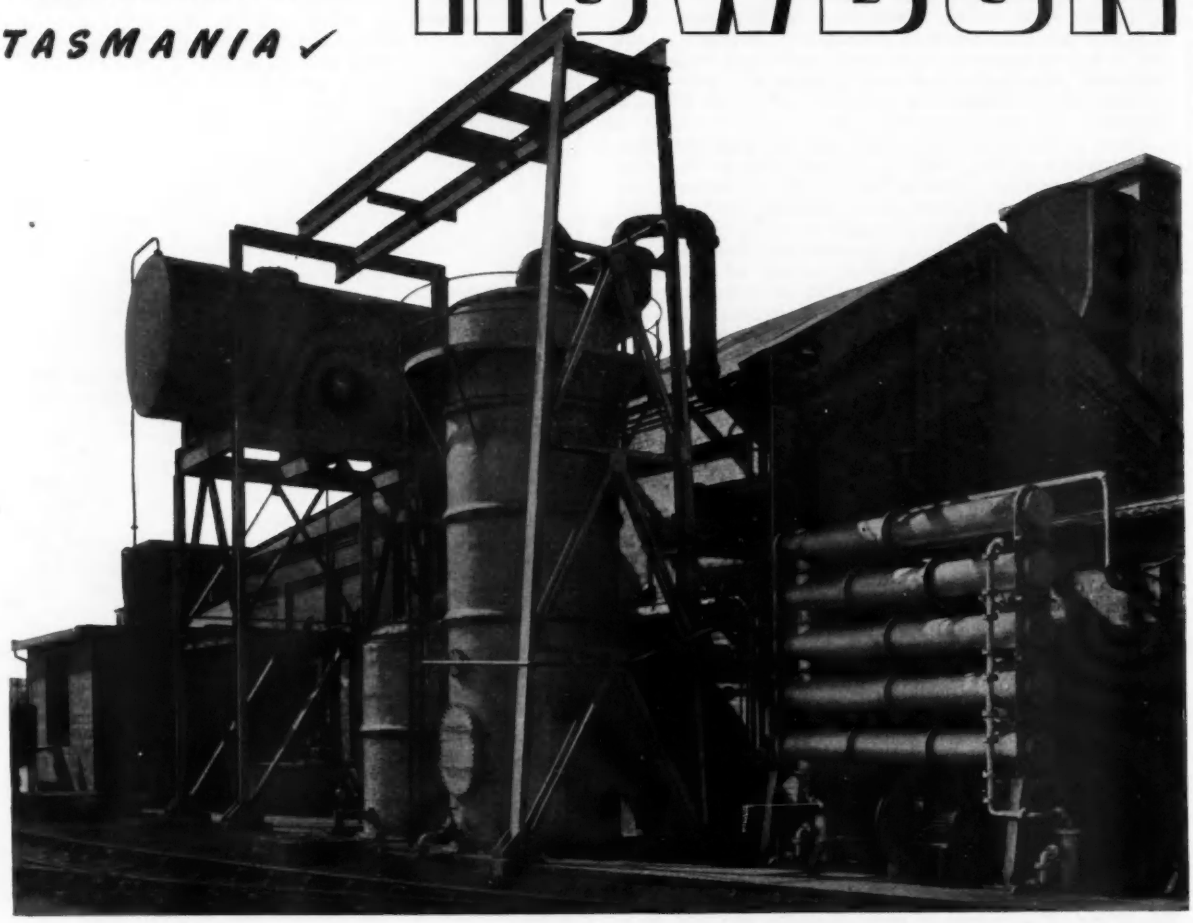

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many people are employed on tasks of considerable diversity, the situation is very different. Within the territory of an area gas board, for example, employees are widely distributed, and personal contacts with the chairman and members of the board, and chief executive officers, can at best be occasional only. For all practical purposes, therefore, the operations of the board have to be organised into well defined units or working groups which permit of closer relationships between managers and managed, and where effective arrangements can be made for regulating matters of local interest. If prompt decisions can be given, followed by early action, any feeling among employees of remote impersonal control is largely avoided. This can only be done by a clear delegation of authority to responsible executive officers at appropriate levels, and these officers must be competent judiciously to exercise it. The idea is that every individual, at whatever level he may be in the organisation, should know that there is someone in the line of authority above him who understands him as a person, who can appreciate his work, who can listen to his suggestions about it, and who can ensure that proper attention is given by 'management' to these matters. Conditions such as these are essential to the successful working of joint consultation, and it is very much on this footing that the consultative machinery in the gas industry has been designed.

At local levels, joint consultative committees have been set up in accordance with the terms of a model constitution agreed between management and trades unions. The form of these committees depends entirely on local conditions and may, for example, provide one committee for all grades of employees, or a number of committees each for a different group of grades, if this is preferred. Changes in the form adopted can be agreed upon at any time. The committees may decide how often they meet, but not less than quarterly.

At the national and regional levels, the negotiating and consultative machinery is combined and operates through joint councils

(i) for manual workers;

(ii) for clerical, administrative, professional and technical staffs; and

(iii) for senior and managerial staffs.

A joint standing committee of the first two councils mentioned is responsible for negotiations on behalf of 'intermediate grades'—*i.e.*, those not catered for by the then existing machinery.

It will be seen, therefore, that in these arrangements there is a very desirable element of flexibility which gives scope for local initiative and responsibility.

Intelligent Animating Force

Admirable though all this framework may be, it is, after all, but the dry bones of the matter, so to speak—of little or no use without the intelligent animating force which alone can bring them into purposeful activity. The initiative, in the author's view, falls plainly on management. There must be a positive belief by engineers and managers that joint consultation is an essential part of management, and they must be prepared to guide the deliberations of the committees into broad and constructive channels. The joint consultative committees—advisory only though they are—must be seen to have a status which attracts the interest and respect of all ranks among the workers. If, as is sometimes the case, these committees are regarded merely as a sort of safety valve for the ventilation and redress of minor grievances and the discussion of relatively trivial items—useful and necessary as this undoubtedly is—they will fall very far short of the main object they are intended to serve in a nationalised industry, and that is to create among the employees generally the feeling that they are in a real sense participating in the efficient administration of the services, and, in so doing, must take their full share of responsibility.

The joint consultative committees are not only media for exchanging information; they have an educational value which should not be underestimated. If it is important for management to appreciate the point of view of labour, the industrial worker for his part needs to be far more enlightened than he is at present on the degree of skill and ability which is involved in the direction of capital and labour into the proper channels, the lay-out of the business, the adoption of the best techniques in production, distribution and service to the consumer, and even the problems of finance. These are matters of high policy maybe—in some respects too remote from their own experience for operatives readily to understand. But is there any good reason why, as occasion arises, they should not find a place on the agenda of the joint consultative committees? That this is not too much to ask is indicated by the actual experience of area gas boards. Although, as might have been expected, attention in the early stages was almost entirely directed to welfare and safety, there has been a marked tendency for discussions to take place on such matters as the improvement of the consumer services, the modification of plant and equipment, the utilisation of materials, and the use of tools.

Question of Redundancy

Another good example of the type of case that might arise in this connection is the question of redundancy due either to the closing down of a works or department, the installation of new plant, or general reorganisation. Such matters of policy are of serious concern to the employees, and would need to be carefully explained to their representatives on the joint consultative committees. The implications should be frankly and fully discussed in ample time before the change is to take effect. Other examples will doubtless occur to those concerned.

The smooth working of joint consultative committees will depend mainly on the skill and ability of the local manager or other similar officer who will usually be the chairman of a committee. It is for him to see that the committees are informed not only as to what they want to know, but what, in his judgment, it is right that they ought to know if they are to be encouraged to take an intelligent and sympathetic interest in what is going on in business, or in developments which are in contemplation. It must be the aim to establish confidence and deepen the impression of the co-operative purposes of the whole procedure.

There are, of course, less formal means of consultation, as, for instance, on those occasions where management and employees take part in such welfare activities as sick benefit societies, pension schemes, sports clubs, and in the various occasions on which they are brought together. All this makes for fellowship and goodwill.

Communications

The term 'communications' is intended to cover the arrangements by which individual employees are made aware of the policy and programme of management, and also the means by which the views of employees themselves may be brought to the notice of management. These arrangements are concerned with the relationship of everyone to everyone else in the organisation in terms of the written or spoken word, or by any other means of communication. It is clear, of course, that joint consultative committees themselves are one valuable method of carrying out this two-way system of communications. But they are by no means the only method and do not necessarily cover the whole field. It is quite possible to have active consultative committees with a very apathetic and ill-informed rank and file. It is an excellent practice to exhibit the minutes of the committees or a précis of them on works notice boards, though to what extent they are read, discussed and digested is a difficult matter to determine. What perhaps is equally important is that the employees' representatives should have ample opportunity and encouragement to pass on information and regularly to report back to those who have elected them. It is well worth while to impress on members of committees the representative character of their position and their duty to be in close touch with their constituents.

There is something, too, to be gained in bringing together to meet the chairman and chief officers of the board one or two representatives of each local consultative committee to discuss matters of general interest. This has been done very successfully in at least one area board. The repre-

sentatives were invited to send in questions beforehand on any aspect of the board's operations, and the appropriate chief officers were present to give full and frank replies to the questions. The proceedings were subsequently printed and circulated to all members of consultative committees.

Direct Approach

Apart from these contacts, however, a direct approach to individual employees and groups of employees is vitally necessary to prevent consultative committees from becoming little worlds in themselves somewhat insulated from the broader aspects of the board's business.

The direct approach may be either written or personal. Gas engineers will be aware of the use of house journals—as well, no doubt, of their shortcomings. They are one method of communication which is not always so well exploited as it might be. Another example of the direct written approach is the issue of a 'popular' edition of a board's annual report well illustrated by picture and diagram so as to make a vivid presentation of the achievements as well as aims and policy.

Greater effect can often be obtained when the issue of reading matter can be supplemented by the engineer or other local senior official gathering his men round him at a meeting and telling them first hand something of his problems and difficulties as well as planned programmes of the future. This art of taking men and women into the confidence of management is perhaps not an easy one to practise, but it is one which engineers, busy though they are, would find it well worth while to cultivate. The author remembers in his old company having the opportunity of meeting the men in large groups on the works and discussing with them problems of national insurance pensions, sick funds, and so on. The process was mutually educative, and engendered a confidence and understanding which it would have been difficult to achieve in any other way.

There is another aspect of communications which should not be overlooked. It is sometimes the case that there are good channels of communications between chief and senior officials, and healthy contacts with the rank and file workers, but, of all contacts between workers and management, the most frequent and continuous are those with the foremen and supervisors on the shop floor or on the district. It is on the quality of those contacts that the tone of the respective working groups most directly depends, and it is through them that the policies and attitude of higher management should find expression. In the eyes of the worker, the foreman is the firm. He it is who embodies and exemplifies in concrete practice the firm's treatment of the employees. Any system of communications, therefore, which does not keep the foreman fully in the picture is bound to be very much less effective than would otherwise be the case. It will surely be agreed that competent and contented foremen are an essential part of a successful industrial organisation. Here again is a matter which is largely the responsibility of the engineer or local manager, and it is worth giving serious consideration to devising ways and means of making the foreman an active and enthusiastic participant in all forms of consultation and communications.

Conclusion

The whole problem of human relations is highly complex, concerned as it is with the behaviour and aptitudes of people whose employment brings them together in circumstances of considerable diversity. It has many aspects, and practical measures for dealing with them call for constructive imagination and sound leadership on the part of management and responsible trade union officials alike. In the matter of good management techniques, there is no standard prescription capable of universal application. These can only be evolved by patient experiment and research in relation to the special circumstances which govern the operation of any particular business. This is not only true of private enterprise, but also of the nationalised industries. Much may be gained by the exchange of information between these industries, since all of them are under the same statutory obligations to establish machinery for the negotiation of wages and for joint consultation; but each has its own peculiar problems conditioned largely by their different historical backgrounds and administrative structures.

The fact that, in the development of an enlightened policy, the industry should also have established cordial relations with the trades unions concerned is a rewarding achievement which augurs well for future co-operative effort. How different might the situation have been—and how much more difficult—if in place of this goodwill, the gas industry had brought with it a record of antagonism and distrust!

The road ahead will have its pitfalls. Differences of opinion in matters of policy organisation and procedure there are bound to be—as in any progressive enterprise. But where confidence exists—as it surely does in the gas industry—these differences should be resolved with little disturbance of the harmonious relations whch have grown out of past experience. In this respect, the gas industry today is heir to a great tradition—and in this tradition alone lies a powerful incentive both to management and employees to raise to yet higher levels the reputation of the industry for efficient administration and public service.

DISCUSSION

Mr. R. Prince (Chief Engineer, South Eastern Gas Board) said he could think of no one better qualified to address the Institution on human relations in the gas industry than Mr. Lesser. He had a long experience of his subject with the former South Metropolitan Gas Company and brought to it an analytical perception balanced by a keen sense of justice and a warm affection for his fellow men and their welfare. Nor could a more opportune time than the present have occurred for, as had been said by Mr. K. L. Stock, until recently Under-Secretary of the Gas Division of the Ministry of Fuel and Power, the industry had reached the 'end of the beginning' in its affairs since nationalisation, in the sense that the work of reorganisation had really come to an end, and the industry was now taking breath to go ahead free from uncertainty.' There could be no more important subject to which study should be given than that of human relations and they were very grateful to Mr. Lesser for the clear concise principles which he had set out in his paper.

The author, not unnaturally, reviewed the past in the light of his experience of co-partnership as practised in the South Metropolitan Company, but he was pleased to note his acknowledgment of the 'important stream of influence and tradition flowing out of the local authority gas undertakings.' While he would not wish to undervalue the great contribution made by co-partnership, he was certain—and he spoke from experience with municipal, non-co-partnership and co-partnership companies—that human relations did not in any sense lag behind in the progressive and well run undertakings of the local authorities and non-co-partnership companies, and that all and each made their fair contribution to the notable record of the industry in that respect.

He felt some anxiety lest they should lose that sense of personal contact between management and worker which was so real in former days and was, he believed, the very essence of good human relations. Since nationalisation the concept of management had, for a number of reasons, necessarily undergone a great change.

Lengthened Chain of Command

Firstly, the building up of large centres of production, in place of a number of small works, while technically sound and inevitable, had had the effect of lengthening the chain of command. In the former individual undertaking a man knew that only the engineer and manager stood between him and the board or committee—and the engineer and manager himself equally knew that his success depended upon his gaining the complete confidence of both his board, or committee, and the employees. Today the employee was aware of a number of specialists advising his immediate chief and of other officers interposed between him and his board, all of whom exerted an influence on the more direct relationship between the two.

Secondly, whereas the former engineer and manager moved daily among his employees, knew not only their names but much of their personal history and difficulties, today many employees rarely saw their chief and only knew his name by his signature on the large number of documents he posted on the notice boards. He did not wish in any way to belittle the good work done by works committees or employment officers, etc., but he felt they needed time to grow in their

responsibilities and become mature before they could command universal confidence and, in his view, they did not take the place of real personal contact between managers and managed so far as human relations were concerned.

Is There a Practical Answer?

Was there any practical answer to these difficulties? He suggested:

(1) The station engineer must be not only justified technically but must be well versed and trained in the art of management.

(2) It must be beyond doubt and amply demonstrated that the station engineer was in command and, so to speak, was the Board. He must not be by-passed in the communication of directions but at all times be fully briefed in Board policy relating to employment conditions and be able to give the answer on the spot. Nothing was so lowering to the morale as a constant reference back from the station engineer to his senior officers—if he unfortunately did not know the right answer he should 'fence' until he obtained it.

(3) Station engineers should not have their appointments changed too frequently. It took time to establish confidence between managers and managed and a change in leadership was always followed by a period of unsettlement on both sides until good relations were established.

(4) Methods must be devised to relieve the station engineer of so much paper and office work so that he could perform his real function and have more time to foster human relations.

The author had directed his paper more particularly to young engineers, and although he (Mr. Prince) had spoken of the station engineer, his remarks applied equally to all groups of management. They would do well to pay careful study to a most valuable paper, and he would express thanks to the author for a timely and helpful contribution.

Artificial Distinction

Dr. Alfred B. Badger (Industrial Relations Officer, Gas Council), who made it clear that he was expressing his own views and not necessarily those of the Gas Council, said he could not agree with Mr. Lesser's artificial distinction between industrial relations and human relations. There was a danger in trying artificially to distinguish between them. In the coal and electricity supply industries vast organisations had been set up which were completely separate from the negotiating machinery to deal with welfare, health and, be it noted, efficiency. It was traditional that the man who paid the piper called the tune, but in those two industries the machinery which authorised increased pay and improved conditions of service could not ask for any *quid pro quo* in increased efficiency, which he thought was an absurd position.

In the gas industry they had avoided setting up machinery based on what he would call a false thesis of that kind. In other words, the gas industry regarded a man as one unit and did not attempt to split him up into health, welfare, education, training, and so on.

If the statement of the late Sir George Livesey of 50 years ago was urgent then, it was infinitely more urgent today, because the problem in the economic field was infinitely greater than it had ever been in the gas industry.

The World Today

We had bled ourselves white in two world wars; we had lost our foreign assets; there was a greater and more frequent emergence of highly equipped technical nations with whom we had to compete in the overseas markets, and we carried a re-armament expenditure burden unexampled in peace time. Secondly, politics had entered into the industrial field as never before in history. The trade union movement was very powerful and its power was exercised day by day in the industrial or human relations field. Thirdly, with diabolical and immensely destructive weapons at the disposal of man, on the solution of human relations literally depended our survival.

He would not say much about the selection and placing of labour; he agreed with the author's views on that subject and there was a vast amount of literature written about it. He would similarly not say much about joint consultation, because there was a series of articles on joint consultation currently appearing in the *Gas Times*. At the same time so far as communication was concerned, an article recently appeared in *Coke and Gas* to which he would draw attention.

One of the most important characteristics of management today was the ability to handle men, the manager's ability to conduct human relations in the day to day conduct of his business. Let no man think that competence in human relations or in industrial relations was imbibed with one's mother's milk. It must be studied; it must be studied assiduously and throughout the career of any manager who was in charge of men. If anybody doubted that which Mr. Lesser had clearly emphasised, the highly complex and difficult nature of this problem, let him on the one hand survey the enormous progress in the technological and scientific fields in the last century. Then let him turn his head and survey the melancholy spectacle in the world of human relations where we had the world split into two apparently irreconcilable ideologies.

Production Must Be Increased

As far as this country was concerned, nobody appeared to want to increase hours or reduce wages, although we were faced by competition from countries working longer hours and at less wages. Therefore, if we were to retain our position in the economic market, if we were to preserve our present standard of living, the only way was to increase production, and we could only increase production by improving our technique and our industrial relations, or by improving our human relations. The second was the more difficult of the two.

It was a platitude, but one often ignored, to answer the question 'What does man want out of life?' by saying 'Happiness.' The happy employee—he did not mean the contented employee—was the only type of employee who could give of his best to his employer. The employee today was torn assunder as never before in the history of mankind between his internal compulsions and external compulsions. If he neglected to satisfy his internal compulsions and only satisfied his external compulsions, he would do so at the expense of his personal happiness and, therefore, at the expense of his personal efficiency. It was not true that a man who botched his work or a man who did his work in a slipshod and careless manner was happy. He might do so at the behest of some power external to himself, but he had an internal compulsion to do the best that was in him, because there was no greater joy in life than to think of a job well done.

Job Placing

Job placing, to which Mr. Lesser had drawn attention, was a difficult task, and day by day in industry round pegs were put into square holes and there they remained for the rest of their lives. A man in such a position would never be efficient because he was not happy in his job and could not possibly give of the best that was in him. The next internal compulsion was education and training. A man might be placed in a job suitable to his talents, but unless he had the competence to fulfil that job properly he would not be happy in it and would not, therefore, be a very valuable employee.

There was then the need for recognition. Some people would go on working well and efficiently throughout their lives without any recognition whatever; but they were the great exceptions. The large majority liked to have some recognition either in material or in some other form for a job well done. He implored managements not to flatter such a man—that was worse than useless—but to recognise a job well done by an employee in some concrete form.

Another important internal compulsion was self-respect. Sarcasm was a poison which was ruining industrial and human relations in industry day by day. Management had no right to demean an employee in the sight and hearing of his fellow employees. Indeed, it was a stupid thing to do, because if the use of sarcasm was dictated by a desire that that man should do his job better, one was achieving by sarcasm the very opposite of that which it was desired to achieve. In fact, perhaps a life-long enemy was created among one's employees. The next internal compulsion was the question of discipline. There was a widespread revolt against discipline. In some quarters it was regarded as tyrrannical or irksome, but no work could be properly performed except in an atmosphere of discipline.

A Feminine Viewpoint

Dame Vera Laughton Mathews (Gas Council) agreed with Dr. Badger that it was difficult to separate industrial relations and human relations. They must have the right machinery, but they must also have the gift of understanding people, a gift which was difficult to acquire. She wished to say a word from rather a different point of view, on the value of service experience, because so many people in industry spoke as if the years they spent in the services were wasted so far as industry was concerned. She did not believe that at all, and there must be many who shared that view. In the services one had great experience of dealing with people on every level, and learnt a great deal about people of all kinds. There was also the matter of discipline to which reference had been made, and there were many aspects which she could emphasise if she had the time. There was, for instance, the question of channels of communication, the most valuable thing which one learnt in the services, and she had been amazed to see how similar was the structure in a large industry to that of the services.

There was also the question of staff work which really meant looking after one's chief, because human relations to her mind was not only a matter of management and workers.

It was also a question of the staff, the workers, having loyalty and co-operating with those who were above. She sometimes felt that people in charge of stations who were being visited by the chiefs of the industry in their area were thinking about themselves, and did not think sufficiently of the personnel whom they were supposed to be looking after. That was all part of human relations. In fact, it was not possible to sum-up such a vast subject, but she would say that human relations was the art of being able to put oneself in the other fellow's place.

Joint Consultation

Mr. R. S. Johnson (Deputy Chairman, South Eastern Gas Board) said the widened scope of the joint consultative committees made increased demands on local engineers and managers, and the area boards would watch with interest and sympathy the growth of the new leadership now called for. Size, while presenting to area boards opportunities of profitable integration, brought difficulties in its train, and questions might arise at the joint consultative committee which the works engineer or local manager did not feel competent to answer without first consulting other officers of the board. The wise way of handling such questions was to ensure that notice of them was given in advance, and to carry out the consultations before the meeting; or, if that was not possible, to defer them until the next meeting. The local engineer or manager should avoid saying openly to the committee that he must consult a superior officer. All men employed at the works looked on the works engineer as the governor, and the boards, although inevitably requiring him to work within the framework of instructions issued centrally were, he was sure, anxious to support him as the local commander.

They must not imagine that those at the centre entirely lacked appreciation of the impact of instructions from the centre at the various works. In his evidence before the Select Committee on Nationalised Industries, Sir Geoffrey Heyworth said that 'headquarters always seems a half crazy place anyway.' It would be for members to judge how far they had been able to measure up to that excellent example from private enterprise. However difficult the situation, it was vital that the position of the local engineer or manager as the embodiment of management should be maintained.

Encouragement of Debate

Joint consultative committees would be well advised to learn to walk before they attempted to run. A foolishly wide interpretation of their right and, indeed, duty, to deal with efficiency in the operation of the services of the employers, would doom them to failure. How could a committee, drawn from those employed at a gasworks, be expected to deliver wise judgments on all the ramifications of an area board's activities? The local engineer or manager would, he suggested, be following a wise course if he encouraged the committee to debate, at any rate in the first instance, the efficiency of those operations of the board with which the members of the committee were most familiar.

The gas industry, which had no monopoly in the supply of heat, was having to contend with competition in all the markets in which its products had been traditionally sold, and that on the basis of repeated increases in the price of gas-making coal in excess of the increase in the price of other coal. So they must be ready to change their techniques and methods, and even their traditional raw material. There would be no point in discussing industrial relations or human relations in the gas industry when the gas industry had ceased to exist. The joint consultative committee was, he suggested, an essential forum for the initiation of changes. It was elementary that a man was the more ready to do a thing—even to change his habits of work—if he was told the reason. The joint consultative committees had come to stay; he hoped employers and employed would combine to make them a success.

Personal Sympathy

Mr. W. A. P. Hoskin (Coke Oven Managers' Association) recalled that Mr. J. T. Haynes, in the course of his Presidential address, had said: 'Not even elected consultative committees meeting periodically round a table can take the place of the personal sympathy and understanding which exists between a loyal workman and a respected superintendent.' That was just what he had in the back of his mind. He had no wish to judge the necessity of any particular measure in large organisations in the nationalised industries, because he had no personal experience of them. He was a manager of one small unit in the coking industry. But as an onlooker he feared that today, instead of human relations, one might be compelled to write 'collective relations.' Human relations might be defined as appertaining to man. Man was an individual, and it was only by individual attention that one could get down to bedrock bottom. One realised that as soon as a committee was formed, politicians were apt to come into play on both sides and individuals were often compelled to become collective.

The gas industry enjoyed such a wonderful experience of settled relationships that perhaps they did not realise what the other side could be. Most of his life had been spent on the fringe of an industry in which relationships had been anything but settled throughout the last 50 years. There was a very real need to keep the word 'human' uppermost. His only suggestion in this field, since he was not an expert, was that perhaps it might be possible when considering this problem that some aspect of this important subject could be left to the manager at unit level so that he could keep that very real relationship referred to in the President's Address.

The Author's Reply

Mr. H. Lesser replied that there was little to be said because speakers generally had been sympathetic to the views he had ventured to present, and all had agreed on the complexity of the problem, because man was, after all, a mysterious and complex entity. They were dealing with that aspect of man at work which involved sympathetic understanding, not of him only as a worker, but of him as a human being, and the whole philosophy of the subject lay in that fact. Those who were in command, those who gave orders, those responsible for technical and industrial processes, should bear in mind that they were dealing, not with the individual only in his working capacity, but with the whole man. It was important to have some idea of what might be influencing that man in the other part of his life which had a great bearing on his approach and attitude to his work.

He thought Mr. Prince had brought out the salient point, which was that there should be a more intimate personal contact and understanding between the engineer and the men under his control. It was that more intimate personal contact which brought out the other aspect of the subject to which he had just referred.

A Poor Man's Lawyer

He spoke from a considerable and happy experience. For some time he acted towards large numbers of men in the rôle, so to speak, of a poor man's lawyer, and it was a revealing experience. He heard their personal troubles, their family difficulties, and he could give numerous examples of a very human kind which sent him home thinking and reflecting on the sort of life those men were going to and from. He found a degree of confidence, gratitude, and understanding which enabled him when meeting great gatherings of men—2,000 of them—to feel that they came with an appreciation of just the sort of thing that he was able to give them on that intimate personal footing. It brought about an atmosphere which made it easier to talk to them about business relations and so forth. Those vivid experiences always lived with him, but they made working life something worth while.

Dr. Badger had been good enough to elaborate in some detail. He understood what he meant when he expressed his disagreement with the distinctions between industrial relations and human relations. It was not so much a matter of machinery, because Dr. Badger referred to other matters. Let them be frank about this. There were many people he had met in industry who were sceptical about all this talk about human relations.

The Real Incentive

The argument was that the only real incentive was the financial incentive. When they talked of social well being and mental happiness and things of that kind of men at their work, they were speaking of a field of communal effort where the interest of the employer was the interest of the workman and the interest of the workman was the interest of the employer.

There was a great force in what Mr. Johnson had said about the engineer being the governor in every sense of the word and knowing the answers to the questions put to him, because the board or the company or the employer was represented to the work people by the personality of the one whom they might regard as their chief. That was why in the paper he had said it was so important to break down the line of authority and arrange matters so that the employee might know that in the line of authority immediately above him there was somebody to go to who knew his work and who could answer his questions. The point about joint consultative committees was that one must never lose sight of the educative value of those committees. Many times a man had said to him after a meeting, 'Well, it has been quite an education to be on this committee.'

BRISTOL'S INSTRUMENTS

Nearly 100 members of the Institution spent an afternoon on a conducted tour of the Weymouth Works of Bristol's Instrument Co., Ltd.—the process control division of Elliott Bros. (London), Ltd. The party came over from Bournemouth by coach and car. Demonstrations of instruments of special interest to the gas industry were featured.

Among the instruments demonstrated were two types of telemetering equipment—Bristol's impulse duration and Elliott's proportional current systems. Both these systems have a wide application in the industry; the impulse duration being used largely on distribution networks where multi-channel working over a single pair of wires is required, while the proportional current system finds an application in internal works networks and limited development distribution lines.

Several interesting examples of panels were on show, among them being a co-ordinated control panel for a solvent recovery plant where, by a centralised system of instrumentation, the operation of three adsorbers was brought under complete automatic control. Unit construction governor house panels of a standardised type were of particular interest.

Assembly and Calibrating Shop, showing 'Drimac' transmitter assembly in foreground.

Some of the visitors arrive at Lynch Lane, Weymouth.

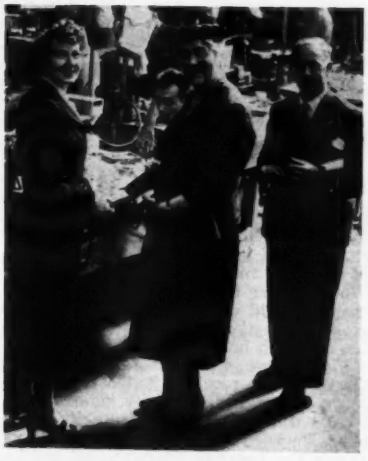
An instance of the complete instrument service now offered to the industry by the Bristol-Elliott organisation was the exhibit of Elliott thermo-electric recorders and indicators. These instruments are complementary to the Bristol range of thermometers, gauges and controllers.

Two new instruments—exhibited for the first time—caused lively interest. These were the Elliott Optrix Optical Pyrometer and the Millivoltmeter Controller. Both instruments work on well-known principles, but incorporate up-to-date constructional features, making for the utmost reliability.

It was interesting to see the methods used in the production of Bristol pressure measuring elements. These elements have been widely used in the industry for over 60 years.

The 'Drimac' differential pressure transmitter, now manufactured at Weymouth, was also on view. This instrument is a further addition to the Elliott-Bristol range of instruments and has an application in the measurement and transmission of differential pressures and flows of corrosive and solid laden liquids in hazardous atmospheres.

The visit ended with a buffet tea in a marquee on the lawn and a speech of thanks by Mr. Bernard Clarke, M.B.E., J.P., Member of Council, followed by Sir Andrew Clow, K.C.S.I., C.I.E., Chairman of the Scottish Gas Board. Dame Vera Laughton Mathews, D.B.E., Chairman of the Women's Gas Federation, was presented with a bouquet by Miss Sylvia Roff, the youngest member of Bristol's staff.



Dame Vera is shown the works by Mr. J. F. Wright, Managing Director of Bristol's

The Gas Industry's Most Important Challenge

Sir John Maud Looks into the Future

SIR JOHN MAUD, K.C.B., C.B.E., Permanent Secretary to the Ministry of Fuel and Power, was the principal guest at the President's lunch in the Ballroom of the Pavilion, Bournemouth, on the Monday of Institution Week, May 31. In a stimulating, exhilarating, and challenging address he referred to three great challenges that faced the gas industry—from electricity, from oil, and most important of all, from the deterioration in the quality and quantity of coal.

After apologising for the absence of Mr. Geoffrey Lloyd, Minister of Fuel and Power, Sir John said one of the things the Minister had to do was to explain their battles to the Members of Parliament, and other less and more distinguished people. To have the sympathy of those Members of Parliament was no small part of the battle.

The Top Jobs in the Industry

The Minister and those who tried to help the gas industry regarded themselves as having some part to play in their own battles as well as explaining those battles to the public. The Minister had—and they had to help him—to find the chaps to fill the top jobs in the gas industry. They would remember there was a famous phrase 'Give us the tools and we shall finish the job.' He thought the Minister had responded to what might perhaps have been the call of the gas industry 'Do not give us the fools and we shall finish the job.' The Minister had, he thought, succeeded, and the President had said he agreed, in seeking to provide the very best people possible from inside the gas industry and from outside to fill the crucial posts as chairmen and deputy chairmen of the gas boards, and chairman and deputy chairman of the Gas council. That was the first part of the battle.

The second was to provide that other sort of tool, the money, the capital resources which they must have to do their job. As they knew, Parliament had set a limit on the amount which they might borrow on guarantee of the Treasury, and on each occasion the Treasury's approval had to be obtained by the Ministry for any capital expenditure that the industry required. There they had had the greatest help from all of them in knowing what they were doing so that the Department might prepare the best possible case for the Minister.

Competition Encouraged

The Minister's policy was to encourage free and fair competition between all the fuel and power industries so that the challenge of it might lead to the heights of technical and administrative efficiency. What neither the Minister nor his colleagues could do was to deny the facts of life, and there were certain facts of life to which he would like to refer.

First, there was the fact that since the Institution received its Royal Charter 25 years ago, the electricity industry had increased the quantity of electricity generated between five and sixfold, and during the last five years the oil industry had made much more powerful its challenge as producers of fuel for industry as a whole. Still more significant was the change that had occurred in this last quarter of a century in the matter of supplies of coal.

The President did not mince matters in his address; he showed himself to be a realist. He had challenged the gas industry to note the scarcity and dearness of just those sorts of coal which they liked best, and it was that change in the conditions under which the gas industry worked that presented the most important challenge of all to the industry at this time.

Resourcefulness and Ingenuity

They were realists and would not waste time in nostalgic hankering after the good old times which would never come again when they got the coals which they liked best. Nor would they waste time in fruitless appeals to Sir Charles Ellis and his colleagues in the National Coal Board or to the Ministry of Fuel and Power to bring back those good old times which could not be brought back. Instead of that he believed they would continue to show evidence of that resourcefulness and ingenuity which was the proper response of a robust and self-respecting ingenious industry to the challenge of the scarcity and dearness of the coals which it liked best. They had given evidence of that already. They had sought to use what others had produced in coke oven gas, in methane, and in the refinery gases from the oil industry. They were making great efforts to carbonise the filthy coals that no one ever thought could be carbonised in the old days. They were trying by total gasification to produce gas out of nothing! They were finding new methods of increasing the speed at which plant could produce gas and coke and, still more, they were looking to ways in which they could do without Sir Charles Ellis altogether by using fuel oil and by searching for natural gas which Italy had so triumphantly demonstrated to be one of the answers to the National Coal Board!

He asked everyone to drink to further success in the experiments and resourcefulness of the industry, and particularly to the substantial contribution which the Institution could make in bringing together engineers both from the industry and from the contractors and mixing them with friends from overseas so that technical discussion and inquiry could go forward uninhibited and uncontaminated by any sense of consideration for policy such as must affect some of their friends and in particular people like himself. Independence for research, inquiry and discussion which the Institution offered was one of the things for which they should be thankful.

Improving the Face of Britain

Looking ahead there was a great period over the next 25 or 50 years during which buildings would be erected throughout Great Britain by the gas industry. He asked them seriously to consider whether it might not be possible by the kind of building they put up not only to make posterity bless them for the improvements in the face of Britain that they would effect, but also to see a great advance in the public reputation of their industry.

Were they satisfied with the results of the last 100 years of gasworks building? They had to consolidate a new and great alliance not only between engineers and chemists brought together by the Institution, but between all those at top level of management in the gas industry and in particular those architects who were needed at the earliest stage if they were to produce buildings that were really worthy of the industry and of Britain.

'The question that besets us in this case is, from that old tradition of bad gasworks construction, can gas escape? I believe it will if there can be arranged before anything has happened an early marriage between the architect and engineer and cost accountant—a polygamous but early marriage.'

Notable Guests

The PRESIDENT, in proposing the toast of the guests, welcomed and thanked those who had made possible the practical side of the meeting—members of the Institution staff, members of his own staff in Bournemouth, his colleagues on the Southern Gas Board, and those who had prepared papers for presentation during the week. He expressed the thanks of the Institution to the Press and to those who put on record its activities and discussions throughout the year, and welcomed the representatives of the many local industries who had placed at their disposal their resources for their interest and education. He was particularly pleased to welcome Mr. H. Nimmo, Chairman of the Southern Electricity Board.

Others he mentioned were the representatives of the Society of British Gas Industries, Kindred Associations, the Gas Council, Her Majesty's Ministries, representatives of sister Institutions, and Dame Vera Laughton Mathews, Chairman of the Women's Gas Federation. There was a specially warm welcome for his own Chairman, Mr. A. R. McBain, whose kindly and able direction of the Southern Gas Board made work a pleasure. The same was true of the Deputy Chairman, Mr. S. E. Whitehead, who for a great many years, long before nationalisation, was considered by those in the industry to be the senior man on the South Coast.

The Highest Office

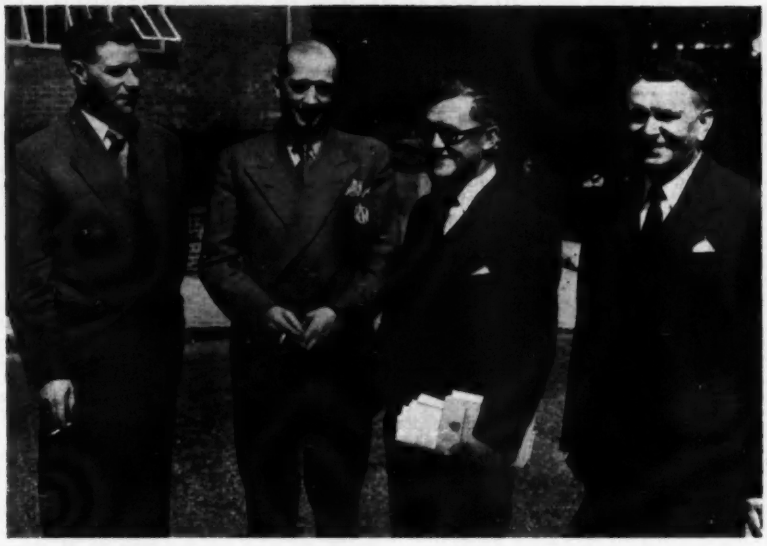
They were proud to have with them Sir Harold Smith, another Past-President of the Institution, who so admirably filled the position of Chairman of the Gas Council, the highest office in the nationalised gas industry, and Sir John Maud, Permanent Secretary to the Ministry of Fuel and Power, who, after a period with the Ministry of Education, now had an opportunity of assessing the results of his efforts. They welcomed the official representatives of the Governments of Australia, of Belgium, France, Holland, and Western Germany, and their colleagues from overseas, M. Ferlet, President of the French Gas Association, and Colonel A. Teutsch, President of the Swiss Association, together with representatives from Austria, Denmark, Holland, Italy, Sweden, and Western Germany. He coupled with the toast the name of the Mayor of Bournemouth, Councillor George Smith, B.SC.

The MAYOR OF BOURNEMOUTH briefly replied.

MR. W. K. TATE, M.A., A.M.I.C.E., President Elect, responding to the toast of

the Institution, proposed by Sir John Maud, reassured the proposer that members of the Institution valued their responsibilities and the charge laid upon them to further the aims of their industry. Unless there was technical advance, technical efficiency and, above all, economy, the whole machinery of the gas industry would falter. The gas industry had been through perilous times in the past. It seemed to come up against a major crisis perhaps every 50 years. It was about 50 years ago that the threat of electricity became so real. There was a complete re-orientation of their selling policy, and they began to branch out into what were then largely unexplored fields of heating. It might be said that the industry had served the public of this country well in that new direction.

Today the threat was of a different kind. They had the threat of a decline in their traditional raw material—not only a decline in quality which, of course, they all knew, but also a decline in availability. If they were going to progress, they must explore new ways and means of producing gas or finding gas. It might well be that there were stores of natural gas under some parts of this country. Whether that were so or not they, as engineers, had to press on with the development of alternative forms of gas making, whether from oil or from a type of coal which they would not touch with a bargepole. He believed that within five years the pattern of gas making in this industry would begin to show some strange but interesting trends. In 50 or more years we should have the atomic age. What would be the gas industry's reply to that he did not know.



L. to R.: M. Kennedy, C. Varcoe (Begwaco), J. E. Cooper (E.M.G.B.), E. Butterworth (Farnworth).

MR. A. R. MCBAIN, C.B., C.B.E., Chairman of the Southern Gas Board, proposed the toast of the President.

MR. HAYNES, in a brief reply, paid tribute to the support he had received from his wife. If Mr. Tate could derive equal benefit in the coming year he would be a lucky man indeed, and they all wished him well.

BOURNEMOUTH'S MOBILE SHOWROOM

When members of the Institution of Gas Engineers during Institution Week visited the Bourne Valley gas distribution centre of the Southern Gas Board they were particularly interested in the new mobile gas showroom which has recently been put into service by the Western Division. The Division serves the whole of Dorset and parts of Hampshire and Wiltshire, where apart from Bournemouth, Salisbury, and Weymouth there are few large towns. A number of the smaller towns and villages, where gas is available, such as Mere, Stalbridge, Charmouth, Verwood, and Brockenhurst, to mention only a few, have no gas showroom and it is necessary for consumers to make a journey, telephone, or write before they can get in touch with the Board's officers.

Care has been taken to make the exterior, as well as the interior, pleasing and attractive in appearance.

The mobile gas showroom now takes all the services of the gas undertaking to the various localities, and already the smart modern appearance of the mobile showroom, plus the good range of gas appliances shown, is increasing sales in the rural districts.

The vehicle was originally built as a mobile coke appliance showroom, and during 1952 and 1953 made two successful tours throughout the area of the Southern Gas Board, where it visited most of the towns and villages in the Board's area, extolling the virtues of coke as a fuel when used in conjunction with modern approved appliances.

Cookers and water heaters are at present the chief features in the new mobile showroom.

It was converted during the winter months and experience gained during the previous tours was used in providing new features, which have resulted in a mobile gas showroom that is a credit to the industry.

A good range of gas cookers, water heaters and space heaters is shown, and in addition an Electrolux L.H.150 gas operated refrigerator is fitted. A salesman/driver is in charge, and our photographs give a good indication of its attractive appearance.

ORGANISATION OF THE GAS INDUSTRY IN THE SOUTH WEST—Continued from p. 772.

a modest degree by attractive promotional tariffs. He (the speaker) believed that the success of the gas industry depended on a complete reformation of its methods of charge, the need for which was, in fact, realised more than 25 years ago. At that time, however, legislation was such that only optional attractive tariffs could be introduced.

Now they had appropriate legislation under the Gas Act of 1948. It was inopportune or politically inexpedient to introduce drastic changes to a long out-dated system of charge. It was obvious that the gas industry provided a service and a commodity. Unless all consumers paid their fair share of the cost of the service provided, then the commodity was bearing an undue burden. Sooner or later the tariff problem must be faced in a big way. It might be that a Select Committee of the House would not be an inappropriate body to investigate and make recommendations on this vexed question.

Mr. Chester had referred to appliance sales and the need for additional load per consumer. Most boards today were prepared to provide free of cost mains and services to new houses subject to the carrying-out by the builder of certain internal carcassing for gas. The approximate cost per house for mains and servicing was of the order of £25. The number of houses so equipped would be in the region of 300,000 per year at a total capital cost of £7,500,000.

Would it not be wise, instead of bearing this cost of £25 per house for a subsequent but problematic gas consumption, to require the developer of the estate to meet the cost and to receive a credit note from the board for, say, £30 a house for the special purpose of purchasing gas equipment to that value from the gas board?

Air Pollution

Dr. **G. E. Foxwell** (Past-President, Institute of Fuel) remarked that there was an opportunity about to arise. It was fairly common knowledge that the Government was determined to do something about the question of air pollution and to do it in a big way. They wanted to see the fuel available for many purposes. At the moment he was speaking only of domestic fuel. If they were to get complete absence of smoke, they must have smokeless fuel. It was to the gas industry that they must look for it. They appreciated the industry's difficulties in supplying gas at a price which would enable the winter space heating load to be taken by gas. They had to look to smokeless solid fuel. Where would they get it?

In Mr. Chester's paper there were three passages which should be taken together as a record of what had been done. The author showed the chaotic conditions in the South-Western area up to vesting date. There was little preparation of coke, no sales policy, and a tendency for both consumers and merchants to regard coke as inferior to other solid fuels. As a matter of fact, that was the tendency throughout the country. Those on the Pollution Committee had been told on the one hand by an engine driver, and by a Cambridge Don on the other, that coke was nothing but coal with the goodness taken out of it.

Mr. Chester had indicated what a change he had made. He had prepared a policy of coke sales and had appointed a coke technical officer. Domestic sales returns had gone up by 20,000 tons a year, and he had increased the sales of coke-burning appliances. That was a record of which to be proud. The author then went on to point to the great interest being taken by the Government and the general public in the question of atmospheric pollution. He (the speaker) asked for the industry's help in solving the problem of replacing the 20 mill. tons of coal by whatever fuel with which it could be replaced. The problem was one of national need. They asked the gas industry to supply coke of the right quality. The coal was at hand if the coal industry would divert it from those who did not need gas coal to those who did. It was essential to sell coke-burning appliances on easy terms. The gas industry should devote as much attention to coke consumers as it now gave to gas consumers.

Colonel Sir Harold Smith, K.B.E. (Chairman, Gas Council), said that Dr. Foxwell had pleaded with them to make more coke and to assist in the problem of getting rid of smoke. 'Of course we shall do all we possibly can,' said Sir Harold, 'to assist in finding a solution to this serious problem. I hope that Dr. Foxwell is not being too optimistic when he says that the Government will really do something about it. We shall see in due course. The answer is quite simple. All Dr. Foxwell has to do is to use his influence to see that this widening gap between the price of gas coal and the price of domestic fuel is narrowed. Prior to 1939 we could compete with domestic coal. Since that time, and particularly since nationalisation, the margin between the price of coal for domestic purposes and the price of coal for the gas industry has widened rapidly. We can only make coke if we make gas, and we can only sell gas if the price is competitive.'

Mr. **E. Wulstan Atkins** (South Eastern Gas Board): 'You may perhaps wonder why someone from the South Eastern Gas Board should speak about the South Western. My excuse is that I started my career in the gas industry with the South Western. There have been occasions outside this industry—and I am sorry to say inside the industry—when papers have been given which really were a series of platitudes. I feel, however, that Mr. Chester has given the industry as a whole a paper of which it can be said that the more we think about it the more we shall find in it.'

Mr. Atkins asked if the author could amplify his reference to tariffs and state to what class of consumers they were limited. There was a shortage of fully-trained industrial engineers. How did Mr. Chester succeed in covering, in a very scattered area, frequent visits to his industrial consumers? One would imagine that in, say, the Bristol Aircraft Company, he would probably have one or more industrial engineers working constantly in such a great works. It would seem fairly certain, without knowing the number of industrial engineers he had, that he could not possibly cover those scattered areas alone. He would like to know how the author brought into the picture his district managers, some of whom could not possibly have detailed technical industrial knowledge.

Mr. **C. H. Chester,** in a brief reply, took first Mr. Jones's point that science and art in any profession must have added to it a working knowledge of finance. In the planning of the original conception cost must inevitably come into the picture. He thought that gas undertakings were now sufficiently large for this essential feature to have a more lasting beneficial effect than some of the schemes of the past, added to which, of course, it was now possible to achieve a higher level of scientific assistance. They sought in planning that, at all stages of the discussion of any project, all concerned were brought into the picture. The engineer had at his elbow a scientist, an accountant, and also a personnel manager.

On base-load work Mr. Jones had enquired about the effect of load factor and the using-up of expensive capital. They had sought in many of the base-load schemes which they had inaugurated to use up in base-load work old and launched capital, with the ultimate object that the old and probably less efficient undertaking would go gradually out of commission. It was true that in some of those works the cost might go up as a result of the loss of certain of that load, but they had clearly demonstrated that the savings made on the larger undertakings had more than outweighed the increased cost of gas production in the smaller units.

In regard to the question of the two-fuel industry and its effect on any scheme of development, it was true that any area board must have its eye on the fuel on which it made its profit, interest, and depreciation charges. But the old relativity of gas and coke production seemed to be altering—in fact seriously altering with the production of coke oven gas in large quantities in certain parts of the country and the export of the coke arising from such production. That particularly affected the South Western Gas Board. The economic tie between gas and coke should not get out of balance. It depended on the satisfactory supply of good quality gas-making coal and the proper treatment of the coke arising therefrom. The production of coke and its distribution largely came into the picture also.

Mr. Bailey had helped him by saying that he (Mr. Chester) had far more than his proper share of the small works. But there was a great deal to be done in the small works. He had also asked him about the optimum size of an undertaking. He would be very bold indeed if he gave him an answer. But he would hazard a guess of somewhere between 10 and 20 mill. therms depending upon the geographical position of that undertaking and the distribution of its main heavy production such as coke. It depended on the size of the works and capital costs which went into it. It was true that a works of much less than 10 mill. could not profitably employ the best technical staff and equipment.

Mr. Wakeford and Mr. Atkins had spoken of tariffs. Generally speaking, tariffs in the S.W.G.B. had been framed with a promotional effect. One realised that in competition with electricity there was not a sufficient gap in the tariffs between first and second blocks. The first block obviously must carry the larger amount of the capital, and they hoped that in future any readjustment of their tariffs would take that factor very much into account, and give the succeeding blocks a bigger promotional value.

Gas Officers Guild's Important Year

Problems of Reorganisation and Redundancy

The eighth annual general meeting of the Gas Officers Guild was held at Bournemouth on May 31. The Chairman, Mr. J. F. Rust (Newport, Wales Gas Board) presided; also on the platform were Mr. J. R. W. Alexander, Chairman of the Executive Committee; Colonel R. H. Studholme, Solicitor; Mr. E. O. Rose (Tottenham, Eastern Gas Board), Vice-Chairman; and Dr. G. E. Foxwell, Secretary and Treasurer. The annual report and accounts were adopted, and the Chairman, Vice-Chairman, and Auditors (Messrs. Kennedy, Smellie, & Co., Epsom) were re-elected. Mr. J. Dickson (Scottish Gas Board), Mr. G. E. Currier (North Eastern) and Mr. A. B. Britton (who recently retired from Hinckley, West Midlands) were elected Hon. Members. A vote of thanks was accorded to the officers on the proposition of Mr. H. J. Risby (Southport, North Western).

The annual report stated that the past year had been an important one for the Guild. A national agreement for a general salary increase for senior officers was negotiated through the Senior Gas Officers Joint Council. The National Joint Council for Gas Staffs, of which the Guild is a member organisation, had negotiated salary increases for graded staffs. A great deal of work, of considerable service to those affected, had been done in resolving personal relations between officers and their boards—generally with results mutually satisfactory. Certain difficulties affecting groups of officers and their boards had been handled similarly. Much work had been done on pensions, a matter of great importance to every officer in view of existing difficulties in making individual provision for retirement.

Membership at March 31 was 1,156. During the year 38 new members were enrolled, but there was a net loss of 38 members. The Guild lost seven members through death. The remaining losses were mainly, as last year, through retirement from the industry by reason of age or through younger members leaving the industry to take employment elsewhere. To assist in making more widely known the organisation, objects and work of the Guild a booklet has been published during the year entitled 'Gas Officers Guild—what it is and what it does.'

Salaries and Reorganisation

The Council viewed with concern the marked reduction of the higher salaried posts now proceeding within the gas industry. Many posts that formerly carried a four-figure salary were now being reduced very considerably. Many advertisements offered salaries that for the posts in question, could only be described as deplorably low. Gas boards had been known to advertise posts at low figures and re-advertise them until they reached the minimum salary which someone was prepared to accept. It was inevitable that centralisation of manufacture and management should change the scope of posts, but it was not accepted that any reduction in the calibre of the gas engineer or other professional officer was thereby entailed. He might have different duties but not necessarily duties that could be performed by a junior or a man prepared to accept, and therefore presumably worth, a salary of the same order as a foreman.

J. F. Rust (Newport) and J. R. W. Alexander, Chairman and Executive Chairman of the Gas Officers' Guild.

The gas industry was in competition with other industries for good men. Unless it paid salaries, not only at the top but to the general body of its professional men, that were not unattractive by comparison with those paid in other industries, the quality of the new entry was bound to suffer. The strength of any industry depended on the calibre of those who worked in it.

The Council had given thought during the year to the possibility of drawing up a logical and satisfactory basis for salaries of senior officers in the light of the present and future structure of the industry. Much work had been done in comparing and co-ordinating the diversity of views that existed on the subject. The marked difference in organisation adopted by different boards involved many difficult problems.

Negotiating Machinery

Consideration had been given by the staffs side of the National Joint Council for Gas Staffs to the exclusion of technical staff from overtime payment. A claim for an increase in weighting of Metropolitan salary scales was rejected by the employers.

No progress had been made towards removing the anomaly, keenly felt by many officers, in that managers and other senior officials who occupied posts coming within graded scales still had their terms and conditions of employment settled by the same machinery as that which dealt with the junior staff under their control. One result was that on appeal the details and merits of their cases sometimes fell to be considered by staff representatives in subordinate positions.

The membership of the Senior Gas Officers Joint Council, as last year, comprised 15 representatives of the employers' side (for the most part chairmen or deputy chairmen of area boards or the Gas Council) 10 from the Guild, and five from N.A.L.G.O. Last year's report contained a lengthy account of the negotiations for a general salary increase for senior officers. Shortly after the publication of the report agreement was reached and the reference of the officers' application to the Industrial Court was withdrawn. The effect of the agreement was that senior officers were awarded a salary increase dating from January 1, 1953, of £125 p.a., less any annual sum already received as a cost of living increase, but without diminution of any such sum in excess of £125.

The Officers' Side of the S.G.O.J.C. is represented by the Secretary of the Guild on the Advisory Committee on Education and Training to the Gas Council. During the year the activities of this committee were devoted chiefly to some of the many problems involved in training and education for management. An extensive investigation into residential educational facilities in other industries ended in a report to the Gas Council advocating the establishment of a residential education and training centre for the gas industry. The idea of establishing a joint centre with the coal industry had to be abandoned for lack of scope for joint working. The committee issued a brochure on careers in the gas industry. It is concerned with recruitment but there are difficulties in extensive recruitment side by side with present redundancy.

Benevolent Fund

An approach was made to the Ministry of Fuel and Power because certain area boards maintained that they were powerless to grant ex gratia pensions in hard cases, for example, where an officer or his widow was not entitled to pension under any scheme or contract or by reason of customary obligation. The Ministry replied to the effect that for the purpose of the Gas Act, gratuitous pensions required the Minister's approval. In the Department's view the appropriate machinery for such cases was a benevolent fund and in 1950 they had put suggestions to the Gas Council for the institution and the administration of such funds. The matter was ventilated in the S.G.O.J.C. and it appeared that there were still differences of opinion between the Ministry and the Gas Council, particularly in regard to the Ministry's contention that the fund should be contributory. There was reason to hope that there might be a satisfactory outcome of the discussions between the Gas Council and the Ministry.

The Council reported that it was in favour of all posts being advertised in order to promote a free interchange of personnel between areas to the advantage of the industry and of the individuals through the wider experience gained and the greater opportunity for advancement. It was recognised, however, that where there was or might be redundancy, it was difficult for an area board to introduce officers from other areas until posts had been found for its own redundant staff.

The Gas Council pension scheme had led to a large number of requests for advice and assistance throughout the year. A Joint Pensions Committee under the chairmanship of Mr. Alexander and including in its membership Colonel Studholme and Lt.-Col. Gould, had been set up by the officers' and staffs' sides of the S.G.O.J.C. and N.J.C.G.S. This committee had been concerned with matters

of principle many of which had involved discussions with officers of the Gas Council.

A deputation led by Mr. Alexander has represented to the Gas Council that pensioners formerly employed by gas companies should be given the same small increases in pensions as had been provided by the Pensions (Increase) Act 1952 for pensioners formerly employed by local authorities. The Gas Council, after considering the matter, refused the request.

The Joint Pensions Committee submitted to the Gas Council a request that, if the local Government Superannuation Act, 1953, did not automatically apply to former municipal employees now employed by gas boards, the Gas Council should join in an approach to the Ministry to secure similar benefits for these employees. This request was also rejected by the Gas Council.

Terms of transfer to the new pension scheme had been and still were being notified by the Gas Council and had caused many members to seek the advice of the Guild. Each case had to be considered on its merits and in the light of the member's family and existing pension rights, but some points of interest had emerged. For each formal pension scheme, the transfer terms appeared to have been calculated on averages. Therefore in some individual cases they tended to be worth more than existing rights, and in others less.

The most frequent problems seemed to be due to the fact that the terms offered in exchange for existing pensions rights were based on wrong assumptions as to what those rights were. There is no reason to think that the actuarial calculations, as such, were not correct, but they had not always calculated the value of the right thing. In some cases it appeared that only a fraction of the existing rights had been recognised, and it was not always easy to discover what they had been assumed to be.

Many members were not fully aware of what their pension rights were. The term was defined in S.74 of the Gas Act to include much more than the meaning normally understood. It included all forms of eligibility for the future payment of a pension either to an employee or his dependants, and also certain forms of expectation.

Legal and Other Cases

A lengthy legal battle successfully concluded during the year concerned Mr. E. Kitchen, a member who became redundant in the Southern Area. He claimed that he had lost his employment in consequence of the vesting of his undertaking; that he had an expectation of a gratuitous pension in addition to the pension payable to him under a contributory scheme; and that he was entitled to be compensated accordingly.

The Board denied each of these claims and with the support of the Guild he therefore appealed to the tribunal. On the evidence the tribunal unanimously decided the disputed facts in his favour. By a majority, however, it accepted a legal argument by the Board that since he was technically kept in employment until 'retiring age,' he was excluded from the scope of the Compensation Regulations. It seemed that this decision might affect a number of members, and the Guild undertook to support an application by Mr. Kitchen to the Divisional Court to quash the tribunal's decision. The application was opposed by the Board and unanimously rejected by the Court. The Lord Chief Justice stated that he was not satisfied that the tribunal had wrongly interpreted the regulations, and doubted whether any human being could understand them. The Board was awarded costs.

Despite this set-back, Mr. Kitchen was advised to take the matter further. Both N.A.L.G.O. and the B.G.S.A. were interested on behalf of their own members and both generously offered to join in supporting an appeal. The Court of Appeal unanimously decided that the regulations had been wrongly understood and they quashed the tribunal's decision. The tribunal therefore issued a new decision in favour of Mr. Kitchen.

During the current year another case had occurred in which the Guild, on legal advice, was supporting a member in an application to the Court to quash the decision of a tribunal. It had not yet been heard. Satisfactory settlements have been reached by direct negotiation on the amounts of compensation payable to certain members for redundancy.

Emoluments in Kind

Reference was made in the last report to the refusal of one board to give effect to the pre-vesting rights of officers entitled to emoluments in kind. In respect of the senior officers concerned, the Senior Gas Officers Joint Council had, in October, 1952, referred the matter to the Area Joint Committee. In February, 1953, the chairman of the board informed that Committee that new terms (which were expected to be acceptable) would be offered to the officers concerned, and that, in the case of any officer who found them unacceptable and had previously registered disagreement, the original terms and conditions would be restored plus the area cost of living increase of 1951.

An assurance was given that in discussions with individual officers there would be no coercion. In this area the fear and indeed the incidence, of redundancy seemed greater than elsewhere, and in individual negotiations officers were apt to feel at a disadvantage. It was hoped, however, that all senior officers concerned would before long receive either reasonably acceptable offers or their emoluments in kind.

Redundancy

Members in the area referred to in the preceding section reported anxiety as to the effect of a major reorganisation, coinciding with the end of the Guild's year, and the steady progress in the closing down of works. At Christmas immediate applications were invited on new terms for a list of posts which were to remain in existence or be created on reorganisation. For posts already existing, even the present holders were invited to apply. Since then, applicants had been called before interviewing panels. In some cases they had been offered for immediate decision, and as the only alternative to early dismissal, a post elsewhere for which they did not apply. Some perturbation had resulted but it had long been the desire of the Guild that confidence and good relations might be raised towards the general level elsewhere, and it was hoped that this might ultimately be achieved.

Reductions of compensation on general salary increases was the subject of representations referred by the S.G.O.J.C. to the Southern Area Joint Committee. This resulted in a compromise offer by the Board which proved acceptable to the member concerned.

The service of grading notices on senior officers outside the scope of the salary agreement for gas staffs was the subject of lengthy negotiations in one area and it appeared that the Board had now accepted the fact that such notices were not applicable.

In the seventh annual report, the Council announced the formation of Area Joint Committees in 10 of the areas. During the year a committee was formed and had got to work in the Southern area. Complete negotiating machinery had now been established in all areas except North Thames. These committees had done much good work during the year and provided a recognised means for ventilating, discussing, and settling purely local issues. In most areas, the Boards had co-operated admirably and these committees had done much to dispel the feeling originally evident in a very few quarters that organised negotiating machinery would be unnecessary for senior officers and would conflict with the principles of good management. On the contrary, frank and private discussion in these committees had smoothed the path for management and had prevented small matters from being magnified by discussion at national level.

Reports from Area Branches

East Midlands.—The entitlement of senior officers to annual leave was considered and recommendations made to the Council. The subject of pensions and the apportionment of superannuation benefits to widows received attention in relation to the 1953 Local Authority Pensions Act.

Eastern. — Membership increased during the year, but there is still room for improvement.

North Western.—The problem of salary scales has been investigated and reports have been made to Council.

Northern.—The implementation of the salary agreement was discussed and much work was done in ascertaining the position in the area.

Scottish.—Integration plans are becoming clearer and their repercussions will require the consideration of all members.

South Eastern.—Among matters discussed with the Area Board and brought to a successful conclusion are the implementation of the salary increase, holiday arrangements for senior officers maintaining their entitlements as they were before the award.

Southern. — Understanding was reached on matters affecting redundancy, transfers and compensation. The branch committee has considered proposals for salary scales for senior officers and has submitted views to the Council.

South Western.—In December notification was given of a major reorganisation of the area by the Gas Board which caused considerable anxiety. The posion has been kept under review, but no indication has yet been given as to how far this reorganisation will lead to redundancy nor how that redundancy if it occurs will be handled by the Board.

Wales.—Relations between the Guild and the Wales Gas Board are of the happiest. The area branch is proud that its chairman, Mr. J. F. Rust, is about to enter on his third year as Chairman of the Guild.

West Midlands.—The Chairman, Mr. A. B. Britton, in the fulness of years has vacated his post in the gas industry to retire to a fastness by the Welsh sea. Mr. S. J. Sadler, for many years Vice-Chairman, has been elected as Chairman. This is the largest branch in the country, numbering 136, and membership has increased during the year.

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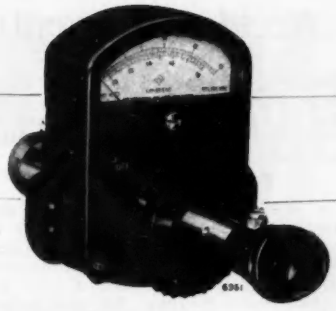

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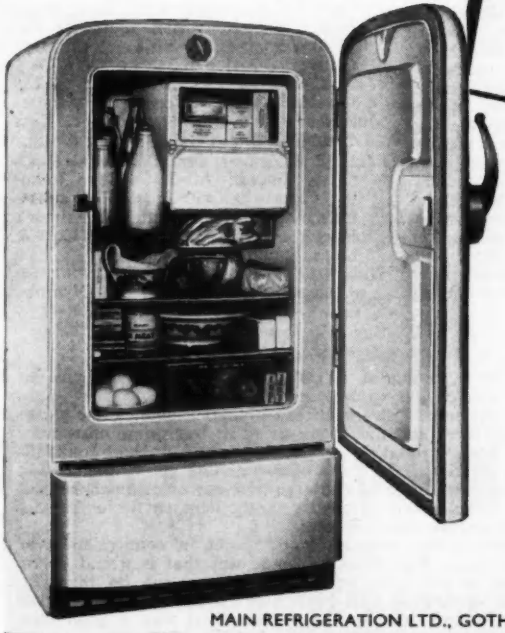

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A Consumer's Accident-Prevention Suggestions

Councillor E. Bayliss presided at a meeting of the North Thames Gas Consultative Council at Caxton Hall, Westminster, on May 27, at which a draft of the Council's annual report for the year ended March 31 was approved. A letter was received from a West Ealing consumer, Mr. F. G. Stephens, calling attention to the recent accidental deaths of two children caused by another child turning on the taps of a gas cooker. In the interests of safety he submitted several sketches illustrating his ideas on how this sort of accident could be prevented.

The sketches have been passed to the Board and Mr. Stephens has been thanked. Considerable interest was expressed in Mr. Stephens' suggestions and it was agreed to ask the Board for its report on these suggestions. It was also agreed that if the Board's report showed that the suggestions were of value, Mr. Stephens should be invited to attend a meeting of the Council and be thanked publicly for his thoughtful and considerate action.

Public Notices

Attention was called to the fact that the existing form of public notices relating to district committees showed only the names of those members of the Consultative Council who had opted to serve on district committees. It was felt that other members of the Consultative Council who did not serve on district committees might also like to have their names shown separately in the notice relating to their particular district.

Members present who were not serving on district committees agreed that their names should appear on the public notices and that absent members not serving on district committees would be consulted individually. It was suggested that the public notice should show first the names of all members of the Council residing in the particular district and this should be followed by members of the district committee.

An Ex-Gratia Allowance

A Stepney consumer asked the Council to investigate an extraordinary increase in her gas account for the period July-October last year. The consumption had apparently increased from a normal of 5,000-7,000 cu.ft. to 28,400 cu.ft. The meter had been officially tested and certified to be 3.3% fast and the Board had made the appropriate allowance on this scale. The consumer contended that the matter should be further investigated as there was no reasonable explanation for the increase.

The complaint had been referred to the Board who reported that as the consumption recorded by the meter was utterly beyond the highest consumption that could be expected from the appliances installed, the Board, without prejudice to its legal rights, had agreed to make an ex gratia allowance of 10,000 cu.ft., which had been accepted.

Exchange of a Cooker

A Hornchurch resident expressed dissatisfaction with the Board's attitude in respect of exchanging his gas cooker. He was supplied with a cooker on hire purchase in 1949 and after a year the enamel began to chip. He complained to the Board, who replaced the defective parts. The same trouble occurred several times subsequently and on each occasion the Board replaced the parts.

The consumer stated that he repeatedly asked the Board to exchange the complete cooker as defective, which it declined to do, on the ground that there appeared to be no necessity for a complete exchange. After further pressure the Board had offered to supply a new cooker and allow from the price the difference between what he had paid in hire purchase and the economic simple hire rate.

He contended that he should be supplied with a new stove and be allowed the whole amount, which he had paid for hire purchase of his present cooker. The complaint was referred to the Board who reported that although six complaints in all had been received, in its view the cooker was now in a satisfactory condition. The consumer had had the use of the cooker for 4¼ years and it was unreasonable for him to expect to pay nothing for that use. The offer to treat the cooker as if it had been on hire appeared to the Board to be fair and reasonable.

The consumer was informed of the Board's view and was told that the Council could not support his contention that he was entitled to a free exchange of his cooker.

Sixteen Residents of the Redburn and Shipley Fields districts of Shipley have sent a petition to Shipley Council protesting against the discontinuance of gas street lighting during the summer months.

National Poultry Show.—To meet the wishes of most of the exhibitors the dates of the 1954 National Poultry Show, Olympia, have been changed from December 9, 10 and 11, to December 8, 9 and 10. The show, the largest of its kind in the world, will be open from noon to 8 p.m. on the first day, and from 10 a.m. to 8 p.m. on the remaining days.

British Thomson-Houston Co.—On May 18 Viscount Brookeborough, P.C., C.B.E., M.C., M.P., the Prime Minister of Northern Ireland, accompanied by Lord Glentoran, M.P., Minister of Commerce, and Mr. W. N. McWilliam, Assistant Secretary to the Cabinet, visited the main works at Rugby of the British Thomson-Houston Co., Ltd. The party was welcomed by Mr. E. H. Ball (Managing Director), Mr. W. W. Vinsen (Director of Manufacture), Mr. H. L. Satchell (Director), and other executives of the Company, who afterwards accompanied the visitors on a tour of the works. The itinerary included the turbine factory, heavy plant factory, fabrication department, control gear factory, industrial electronics factory, lamp works and research laboratory. The visit to the turbine factory was of particular interest in view of the B.T.H. programme now in hand for the expansion of their turbine business, which involves the erection of a new factory in Larne, Northern Ireland.

Diary

June 18.—SCOTTISH JUNIORS (WESTERN): Golf Outing.
June 19.—LONDON JUNIORS: Ladies' Day at Hastings.
June 22-25.—ROYAL HIGHLAND AGRICULTURAL SHOW: Dumfries. Gas Council exhibit.
June 24.—NORTH THAMES G.C.C.: Caxton Hall, Westminster, 2.30 p.m.
June 25.—MIDLAND SECTION, I.G.E.: Summer Meeting. Nottingham.
June 26.—WALES JUNIORS: Ladies' Day: Visit to Rhyl Water Works and journey across Denbigh Moors to Denbigh undertaking. Return to Rhyl for visit to circus. Assemble Rhyl Gasworks 2.15 p.m.
June 26.—MANCHESTER JUNIORS: Ladies' Day at New Brighton.
July 1.—MIDLAND JUNIORS: Ladies' Day.
July 2.—MANCHESTER AND DISTRICT SECTION, I.G.E.: Chairman's Day, Bradford. Lunch, Connaught Rooms, 12.30 for 1 p.m.; visit to Birkshall Gasworks, 2.45 p.m.
July 6.—SOUTH EASTERN G.C.C.: Caxton Hall, Westminster. 11 a.m.
July 6-9.—ROYAL SHOW, Windsor. Gas Council Exhibit.
July 7.—LONDON AND COUNTIES COKE SALES CIRCLE: All-day visit to Reading Gasworks, with choice of subsequent visits to (a) Huntley & Palmer's Biscuit Factory, or (b) Robert Cort & Son's Foundry.
July 8-17.—LAUNDRY, DRY CLEANING AND ALLIED TRADES' EXHIBITION, Olympia. Gas Council Exhibit.

CONTROL OF A GAS GRID—continued from p. 782.

tion of the gas passing at any second of the day, but the record gave the volume of gas which had passed during the day into the holder station.

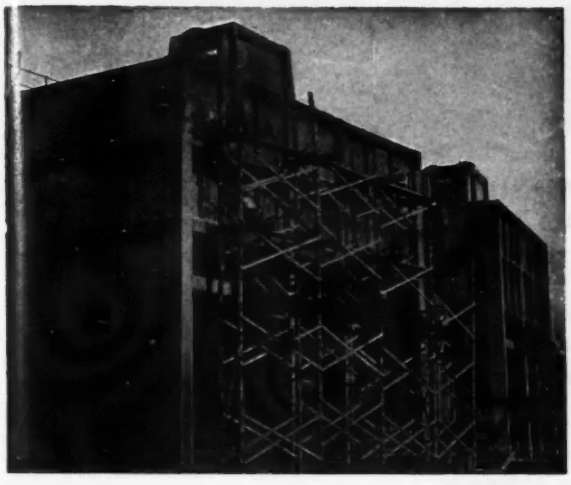
Mr. Plumley had wondered why they did not record all the measurements made in the control room. He would say that visual control was good for everything other than the volume passing into the station. Aldershot was chosen for compression in the Southern group, and Reading was chosen for compression in the Northern group for the reason that these stations lent themselves to easy compression. The compressors were there and why build a central point when they had the plant already available?

He could not understand Mr. Bell's point about spending £7,500 for a saving of £23,000. He thought the figure of £23,000 was capital value over 20 years.

As to the use of steam instead of diesel engines, the steam plant was there and they were using it; but prime costs were not the first essential in his mind, because he had found in working diesel engines that as soon as one got wear and tear in the cylinders there was a large pass-out of oil unconsumed, and the diesel could be a very costly item so far as repairs and maintenance were concerned.

Mr. Aitken had raised a good point in connection with diesel engines. The point he made was that it would be of advantage to put in a smaller compressor, run on the base load, and when peak load was reached allow the diesel engine to come in and take up that peak. That was a good idea and he would certainly look into it.

Gunite



One of the reinforced concrete structures reconditioned with Gunite for the City of Carlisle Gas Undertaking.

Gunite—concrete applied by air pressure—has numerous applications where its great density and extreme adhesion have exceptional value.

For repairing reinforced concrete it has particular merit, as, due to the method of application, a uniform density and adherence is obtained whenever Gunite is applied.

For lining coal bunkers and steel chimneys it possesses great resistance to corrosion and protects steel-work from the abrasive action of coal or coke.

Handbook "GUNITE" sent on request

THE CONCRETE PROOFING CO., LTD.

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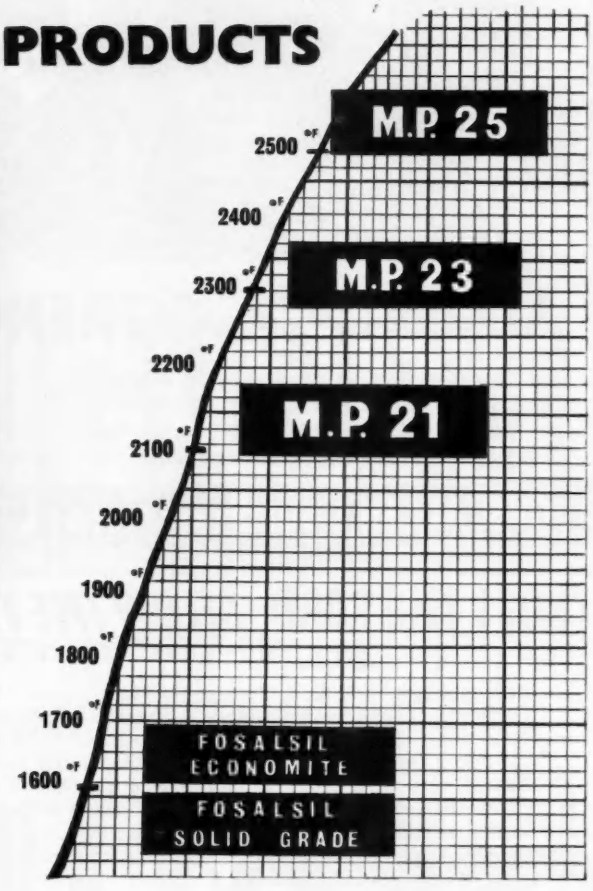
Telephone: Victoria 7877 & 6275

FOSALSIL MOLER M.P.

PRODUCTS



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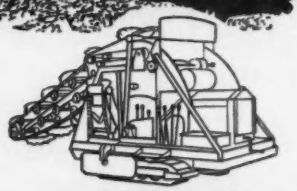
The answer to all your trenching problems

ALLEN *Super Duty* TRENCHERS

For narrow trenches we supply the 12/21 model, and for wide trenches the 16/60 model. Both models are a fine engineering job and capable of standing up to continuous hard work. We shall be pleased to send you further information and fully illustrated brochures on request.



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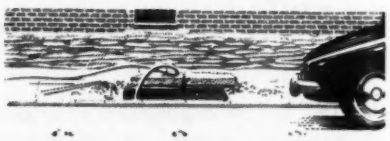
CROSS THE ROAD—*BELOW THE TRAFFIC*

ELIMINATE HOLD-UPS AND UNNECESSARY EXCAVATIONS

For underground pipe and cable installations, the Pass Hydraulic Thrust Borer affords a choice of four speeds of operation. The thrust of 1½ tons per square inch is conveyed by means of hydraulic cylinders moving along fixed rams. Boring can be effected without traffic hold-ups and costly excavations are eliminated. Fully informative literature is available and will be forwarded on request.



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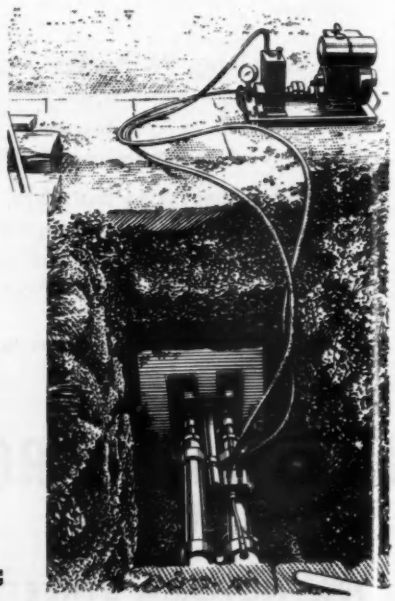
HYDRAULIC THRUST BORING MACHINE

Power operated pump driven by 3 h.p. petrol engine (air or electric drive if required) will cut your labour costs.

The machine ready for use for hand operation. A wide range of accessories such as Enlarging Heads and Drawing-in adaptors can be supplied to order.



Specialists IN UNDERPRESSURE ENGINEERING

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STEEL TUBES & FITTINGS

FOR

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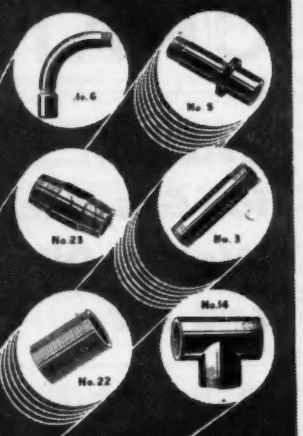

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RUSSELL BROS (WALSALL) LIMITED

BRADFORD TUBE WORKS · WALSALL · ENGLAND

The Bradford Tube Works occupies a factory area of some three acres exclusively devoted to the manufacture of Steel Tubes and Fittings.

Contractors to Admiralty and War Office. Extensive stocks.

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Specialists in the repair of Reinforced Concrete Structures, etc.

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LININGS FOR STEEL BUNKERS.

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GUNITE

CONSTRUCTION CO. LTD

WESTERN HOUSE, HITCHIN, HERTS.

Have you specified

VI-TERNUS

Chemical-Fume Resistant PAINT

FUME-PROOF

PERMANENT

RETAINS COLOUR

ECONOMICAL

Vi-ternus Chemical-Fume Resistant Paint was specially formulated to meet the demand for a material capable of withstanding the penetrating effects of chemical, acid and other fumes, which rot and discolour Gasholders and other Plant. Tests carried out by one of the large Gas Concerns, using a plate coated with Vi-ternus C.R. Paints, suspended over an open bath of ammonia, showed that the Vi-ternus finish was not in the least affected.

This material is at present produced in one colour only, that of Bright Foliage Green, as this colour has proved to be the only shade capable of resisting the fumes, whilst still retaining its colour.

You are invited to place a trial order of say 1 gallon, try it out on the most fume-ridden section of your plant, subject it to the most rigorous tests, and so prove to yourself that Vi-ternus C.R. Paint is everything it is claimed to be.

MANUFACTURED BY

John E. Williams & Co Ltd

Makers of Superfine Paints since 1846

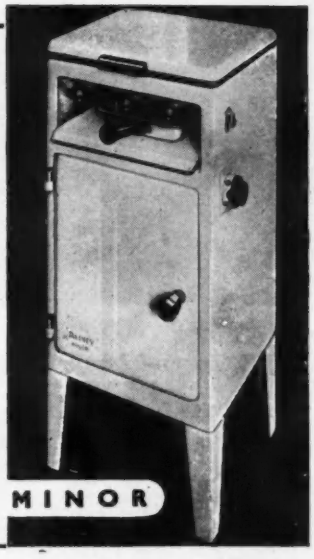
Technical Representative to the Gas Industry:

Mr W. E. Settle,

46 Bridgwater Road, Bradford, Yorks.

PARTINGTON - MANCHESTER

BIG Capacity for LITTLE Kitchens



Especially suited to the kitchens of flats and small houses, this highly efficient cooker provides utmost cooking capacity in the least possible space. Cast iron construction ensures strength and durability and reduces maintenance costs to a minimum, thus making the Dainty Minor particularly suitable for simple hire or hire purchase.

Approved and adopted by leading gas boards

The **Dainty** MINOR

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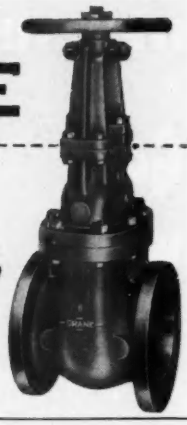

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Write for particulars of how E. B. Service can help in reducing maintenance costs. Manufacturers of all types of Cements.

E. B. REFRACTORY CEMENT CO. LTD.
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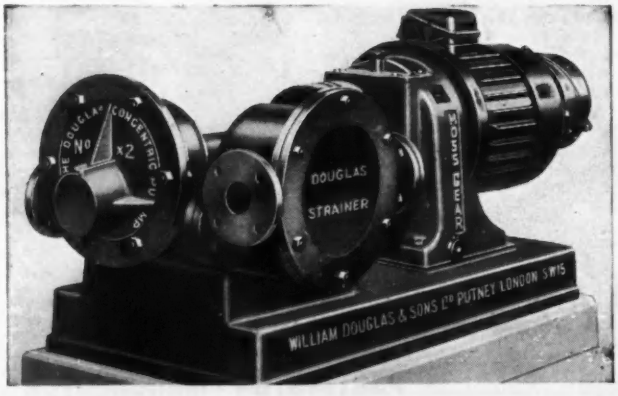
GAS METER CRANKS
Telephone: DUNSTABLE 90
The Clifford Engineering Co., Ltd.
Dunstable, Beds
Specialists for over 30 years
Single and double throw cranks for all meters

CASES FOR BINDING
Quarterly Volumes of the 'Gas Journal'
7/6 each, post free
Walter King, Ltd., 11, Bolt Court, Fleet Street, London, E.C.4.

AMAL
Calibrated Jets & Injectors
to meet a specification of consumption
AMAL LTD., HOLDFORD ROAD, WITTON, BIRMINGHAM, 6



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SHEWN FITTED WITH SUCTION PIPE LINE STRAINER, GIVING CHOICE OF TWO SUCTION LINES, PUMP & STRAINER STEAM HEATED. GOOD SUCTION. SLOW SPEED.

WILLIAM DOUGLAS & SONS LTD., PUTNEY - - LONDON, S.W.15.

PUBLISHERS' NOTICE

The " Gas Journal " is published every Wednesday, price 1/3d.; by post 1/5d.

Subscription Rates: Home and Empire:—52/- per annum; Foreign:—60/- per annum. (Both payable in advance.) A copy of the " Gas Journal " Calendar & Directory is presented each year to continuous subscribers.

Classified Advertisements: All small classified advertisements are charged at 1/9 per line (approx. 7 words)—minimum charge 10/6. A Box Number address occupies 2 lines, and a further 6d. is charged towards cost of postage on replies. Copy must be received by first post on Monday to ensure insertion in that week's Journal.

Displayed Advertisements: Rates obtainable on application to the Business Manager. Change of copy for displayed spaces must be received 14 days prior to publication if proofs are required. Type area of inside pages 10" deep × 7" wide: block screen 120.

BUSINESS MANAGER : S. T. CULLEN

MIDLANDS MANAGER: G. B. Torrance, 42, Wychall Lane, King's Norton, Birmingham, 30.

NORTHERN MANAGER: W. Q. Foster, 33, St. Helens Road, Harrogate. *'Phone:* Harrogate 84291.

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C.4.

Telephone: CENtral 2236-7. *Telegrams:* Gasking, Fleet, London.

WALTER KING SERVICES — 2

GAS SERVICE

" Gas Service " is the specialist magazine for the Sales and Service personnel of the Industry. It covers all aspects of gas service from the holder to the burner. In addition to sound editorials, news items and specially contributed articles, " Gas Service" also reports in the fullest possible manner the activities of the numerous Salesmen's Circles

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DUTCH AND DANISH BOG ORE SPECIALLY ACTIVATED OXIDE OF IRON

Oxide supplied on loan or sale outright. Highest prices paid for Spent Oxide.

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Fascinating, new, multi-coloured brochure, "Fire!—Your Dangerous Servant," can be yours. It tells you why to get Nu-Swift before your fire risk becomes 3-dimensional. Send for it—NOW!

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In Every Ship of the Royal Navy

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WOODEN LADDERS SERVICE CLEANSERS, SYPHON PUMPS, PIPE & BOX LOCATORS

GAS FITTERS TOOL KITS A SPECIALITY FROM STOCK

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"KLEENOFF" *

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FIBRE BRUSHES RUBBER MOPS

"KAY-DEE" *

KETTLE DESCALER

** For resale to the public, and in bulk for Works use.*

BALE & CHURCH, LTD.

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APPOINTMENTS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive or a woman aged 18-59 inclusive unless he or she, or the employment, is excepted from the provisions of the Notification of Vacancies Order, 1952.

GUEST, KEEN & NETTLEFOLDS (MIDLANDS) LTD.

Box 24, Heath Street, Birmingham, 18.

A VACANCY EXISTS for a CHEMIST experienced in Gas analysis. The work will entail the analysis of gas atmosphere and their control in respect of Heat Treatment Plant. The successful applicant must be capable of working on his own initiative.

Apply in writing stating age, experience and salary required to Men's Employment Office.

EAST MIDLANDS GAS BOARD

LEICESTER AND NORTHANTS DIVISION

APPOINTMENT OF—

HOME SERVICE ADVISER—

WELLINGBOROUGH GROUP

APPLICATIONS are invited for the position of HOME SERVICE ADVISER to the Wellingborough Group. Salary range £296-£448 per annum, with commencing salary in accordance with the capabilities of the successful candidate.

Candidates must possess a recognised Diploma in Cookery and/or Domestic Science, and be capable of working independently. They should be proficient in the practical demonstration of gas cooking, laundering and other appliances, and be able to advise consumers on all domestic problems involving the use of gas in the home.

The person appointed may be required to pass a medical examination and unless already subject to a pension scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme within six months from taking up the appointment.

Applications stating age, experience and present position, and giving full particulars of training and qualifications, together with the names of two referees, should reach Mr. D. A. Foster, Group Manager, Commercial Place, Wellingborough, by Wednesday, June 30, 1954.

H. B. TAYLOR,
Divisional General Manager.

Millstone Lane,
Leicester.
June 12, 1954.

(*Classified Advertisements continued on page* 814)

APPOINTMENTS VACANT (ctd.)

AGENT required for supervision of district gas and water mainlaying contracts. Knowledge of reinforced concrete reservoirs desirable. Apply by letter stating age, salary and full particulars of experience to: R. E. Docwra, Ltd., Public Works Contractors Llanover Road, Wembley, Middlesex.

REPRESENTATIVE who is already calling on the DISTRIBUTION side of Gas Industry, offered an additional well established line on generous commission basis.

Write in first instance stating area covered, to: No. 202, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

CHIEF WORKS CHEMIST with Degree or equivalent, is wanted by the South Western Tar Distilleries for their works at Southampton. Applicants should give details of education, qualifications, experience and availability. Salary not less than £750 and dependent upon age and experience. The position qualifies, under certain conditions, for membership of a non-contributory pension scheme and, if necessary, assistance in housing. Apply in writing to the South Western Tar Distilleries, Eling House, Totton, Southampton.

SHIFT SUPERINTENDENTS—
CHEMICAL WORKS IN WEST RIDING
AT KILNHURST AND KNOTTINGLEY

DUTIES include continuous supervision on shift rota with authority of deputy manager—prospects of advancement are appropriate. Salary £500/700 per annum according age, experience, etc., with contributory pension scheme PLUS shift allowance £100 per annum. Applicants should hold qualifications at least as high as the Higher National Certificate in Chemistry. Personal details in confidence to D. W. Milner, Assistant Director, Yorkshire Tar Distillers Ltd., Stairfoot, nr. Barnsley.

WANTED AT ONCE, a young experienced man to work as ASSISTANT to the TAR WORKS MANAGER. Applicants must have had some training in a modern Tar Distillery, and have had experience with Pipe Stills. The applicant must have had sound education, have chemical qualifications, and be really alert and active.

When applying, please give details of education, technical training and qualifications obtained, a brief account of experience in Tar Works, and when available for duty.

The post would carry a salary of not less than £750-£850 per annum, depending on age, experience, etc., is pensionable under a non-contributory scheme, and, if necessary, assistance in housing would be available.

Apply in writing to Plymouth Tar Distilleries Limited, Eling House, Totton, Southampton.

SOUTHERN GAS BOARD
NORTHERN DIVISION
AYLESBURY AND DISTRICT
GAS UNDERTAKING
GROUP TECHNICAL ASSISTANT

APPLICATIONS are invited for the position of GROUP TECHNICAL ASSISTANT at a salary within Grade A.P.T. IV, Provincial 'A', of the National Salary Scales (£320-£510 per annum).

The person appointed will be required to pass a medical examination and to contribute to the Board's Staff Pension Scheme, subject to the preservation of any existing pension rights in the gas industry.

Applications, giving age, education, qualifications, experience, present position and salary, and the names of two referees should reach the undersigned not later than June 26, 1954.

H. G. BROADBRIDGE,
General Manager.

Aylesbury and District Gas Undertaking,
87, High Street,
Aylesbury,
Bucks.
June 1, 1954.

SOUTHERN GAS BOARD
EASTERN DIVISION
PORTSMOUTH, GOSPORT AND
BOGNOR REGIS GAS UNDERTAKING
SENIOR ACCOUNTANCY ASSISTANTS

APPLICATIONS are invited from suitably qualified persons for these posts in the above undertaking.

Two vacancies exist and the responsibilities include the preparation of the Group Financial Accounts and Costing Records in the one case and the control of an expanding Machine Accounting Section, using 'National' accounting machinery, in the other.

Applicants should have had experience in administration and the control of staff.

Both positions will be graded within the A.P.T. Grades IX and X of the Scales of the National Joint Council for Gas Staffs for Provincial 'A' Undertakings, the Salary range being between £635 and £790 per annum.

Each successful candidate will be required to pass a medical examination and, unless already subject to a Pension Scheme by virtue of the Gas (Pension Rights) Regulations, 1950, will be required, if eligible, to join the Board's Staff Pension Scheme.

Applications detailing age, experience and qualifications, and accompanied by a one page summary of these items, should be forwarded to the undersigned not later than June 21, 1954, and marked 'Accountancy Assistant'.

H. M. LAWRENCE,
Engineer and General Manager.

The Square,
Portsmouth.
June 2, 1954.

SCOTTISH GAS BOARD
KILMARNOCK GROUP
TROON DISTRICT
APPOINTMENT OF DISTRICT MANAGER

APPLICATIONS are invited from suitably qualified persons for the post of DISTRICT MANAGER of the Troon District Gas Undertaking.

Applicants must be experienced in the administration and supervision of a gas undertaking and have a sound practical knowledge of continuous vertical retorts, distribution practice and office routine.

The salary will be within Scale A.P.T. IX, Provincia 'B' (£620-£720) with placing according to qualifications and experience, plus free house and allowance for fuel and light.

The post is superannuable and the successful candidate may be required to undergo a medical examination.

Applications stating age, qualifications and experience together with the names of two referees, should be addressed to the undersigned within fourteen days from the appearance of this notice.

ROBERT FIFE,
Group Manager.

Riverbank Gas Works,
Kilmarnock.
June 8, 1954.

PUBLICATIONS

GAS ACCOUNT CALCULATORS

SUPPLIED either by Price per Therm or Thousand, for any specified Calorific Value, in book form, office charts, or pocket charts for Meter Inspectors, printed in clear type. Write for particulars to F. H. WAKELIN, LTD., Calculator Specialists, 354, WHEELER STREET, BIRMINGHAM.

'Phone: Northern 0989. 'Grams: Reckoners, B'ham.

AGENCY

AGENTS required for sale of Syphon Pots, Surface Boxes, etc.; good commissions. Apply: No. 197, *Gas Journal*, 11, Bolt Court, Fleet Street, London, E.C.4.

PLANT Etc. WANTED & FOR SALE

WANTED—Recovered or used Mercury from 14s. lb. delivered, according to quantity: or cash on collection arranged Greater London area: also precious and non-ferrous scrap metals, and in all forms. Belgrave Buyers (G.J.), 5, Belgrave Gardens, London, N.W.8. MAI 7513.

GAS PLANT FOR SALE

6' 0" inside diameter, boiler-jacketed, self-clinkering, carburetted water gas machine. Semet Solway reverse flow, capacity 1,250,000 cubic feet per day, @ 460 B.T.U.'s per cubic foot. Hydraulically operated and complete with Lymn Washer. Electrostatic precipitator and 65,000 cubic feet per hour electrically-driven Holmes Connersville exhauster. Together with manufacturer's list of spare parts.

Plant is surplus due to conversion to propane air gas.

For further details write:

Purchasing and Stores Manager,
British Columbia Electric Railway Company Limited,
1016 Langley Street,
Victoria, British Columbia, Canada

THE BRITISH GAS PURIFYING MATERIALS CO., LTD.

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BOG (DUTCH and DANISH) ORE.

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LONDON ROAD, LEICESTER.

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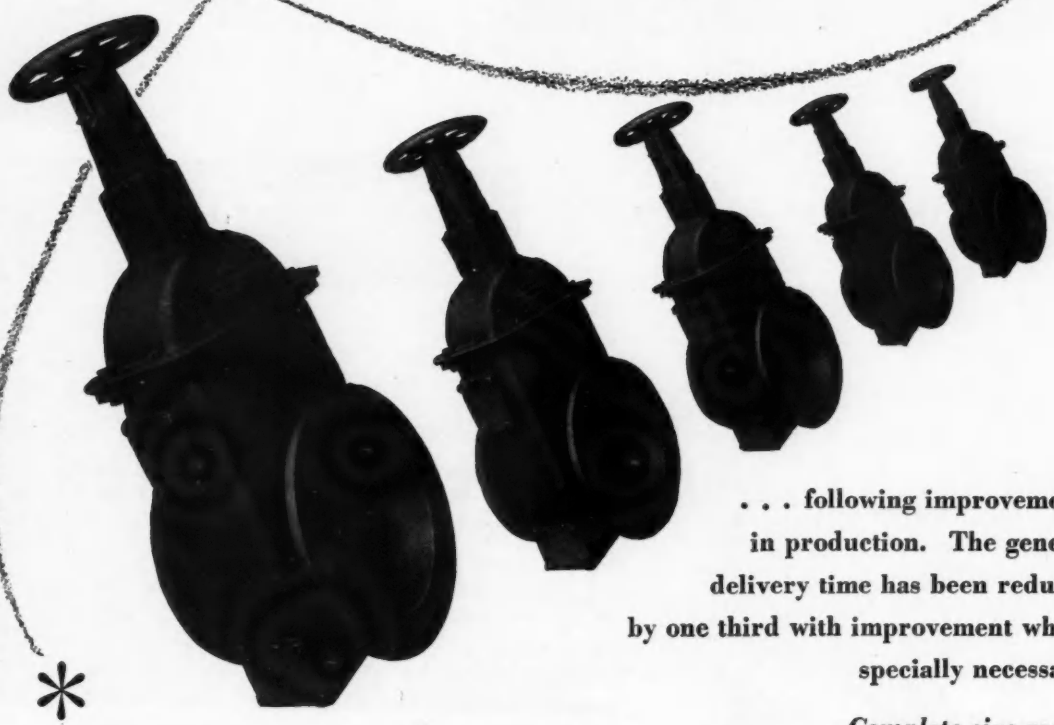
Delivery is better now

Delivery for Standard Vertical Type 24" bore now reduced to one month.



. . . following improvements in production. The general delivery time has been reduced by one third with improvement where specially necessary.

Complete size range available 3" to 48" bore

HOLMES 'WESTERN' VALVES

FOUNDED 1850 HOLMES HUDDERSFIELD

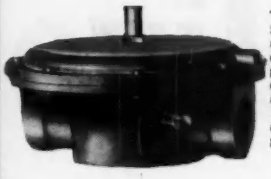
W. C. HOLMES & CO LTD · HUDDERSFIELD · LONDON · BIRMINGHAM

Telephones: Huddersfield 5280 London: Victoria 9971 Birmingham: Midland 6830

C 1882

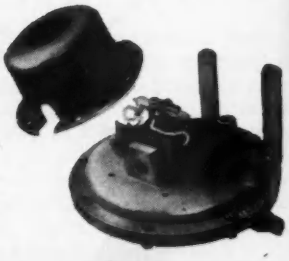
controlling gas supplies

FOR CONTROLLING THE QUALITY OF AIR/GAS MIXTURE *irrespective of varying pressures and resistances. Temperature control is varied by manipulation of the air cock only.*
CAPACITY RANGE: *from 130 to 1,380 cub. ft. of gas per hour according to air pressure (½ lb. to 1 lb.) and size. For low pressure gas systems.*
AIR INLETS: 1", 1½", 1½" *and 2" dias. gas thread.*



THE SINGLE DIAPHRAGM AUTOMATIC SHUT-OFF VALVE *(illustrated left) automatically closes the gas supply in the event of pressure dropping below a predetermined point. Not until all burner cocks on the outlet have been shut and gas pressure restored is it possible to re-open the valve. This appliance is for operation on systems handling 150 to 2,400 cub. ft. of low pressure gas per hour.*

THE AUTOMATIC CUT-OFF SWITCH, *illustrated right, automatically breaks the electric supply to motor-driven gas boosters or compressors if low pressure gas falls below a pre-determined pressure.*
RANGE: *Type 1 operates between .2" and 1.2" w.g. pressure.*
Type 2 operates between 1.2" and 5" w.g. pressure.
Type 3 operates between 5" and 15" w.g. pressure.
Additional applications include its use as (a) an air flow switch in conjunction with a flame failure device and (b) a gas meter protector.



INDUSTRIAL GAS EQUIPMENT

Keith Blackman LIMITED
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522

Lower Lift Protection

For the anti-corrosive treatment of gasholder lower lifts, "Humidine" non-setting paint is now specified almost universally.

There should be no element of doubt where the use of "Humidine" is being considered. Its protective qualities have been adequately proved in very many gas undertakings.

Nevertheless, there may be gas engineers who have not yet had opportunity to assess the qualities of "Humidine". If so, they should write at once for a specification and information.

NON-POISONOUS NON-INFLAMMABLE

'HUMIDINE'

ANTI-CORROSIVE NON-SETTING PAINT

Manufaccured by (ASPINALLS) (PAINTS) LTD., CARLETON, SKIPTON, YORKS.

dm AL1

WILLEY

Point-O-Five

With a capacity of 100 cu. ft. per hour the Willey "Point-O-Five" meter weighs a mere 11 lbs. It is, in fact, lighter in weight and more compact than any other comparable meter. Positive prepayment valve, together with radial valves and enclosed gear box. New prepayment attachment of unit construction simplifies servicing. Bearings in stainless steel. Ask for further information about the compact, light-weight "Point-O-Five". *Approved by the Ministry of Fuel and Power.*

WILLEY & CO. LTD. EXETER · LONDON · MANCHESTER · LEICESTER · DARLINGTON

Associated Company of United Gas Industries Ltd

Newton, Chambers
turn ideas into realities
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